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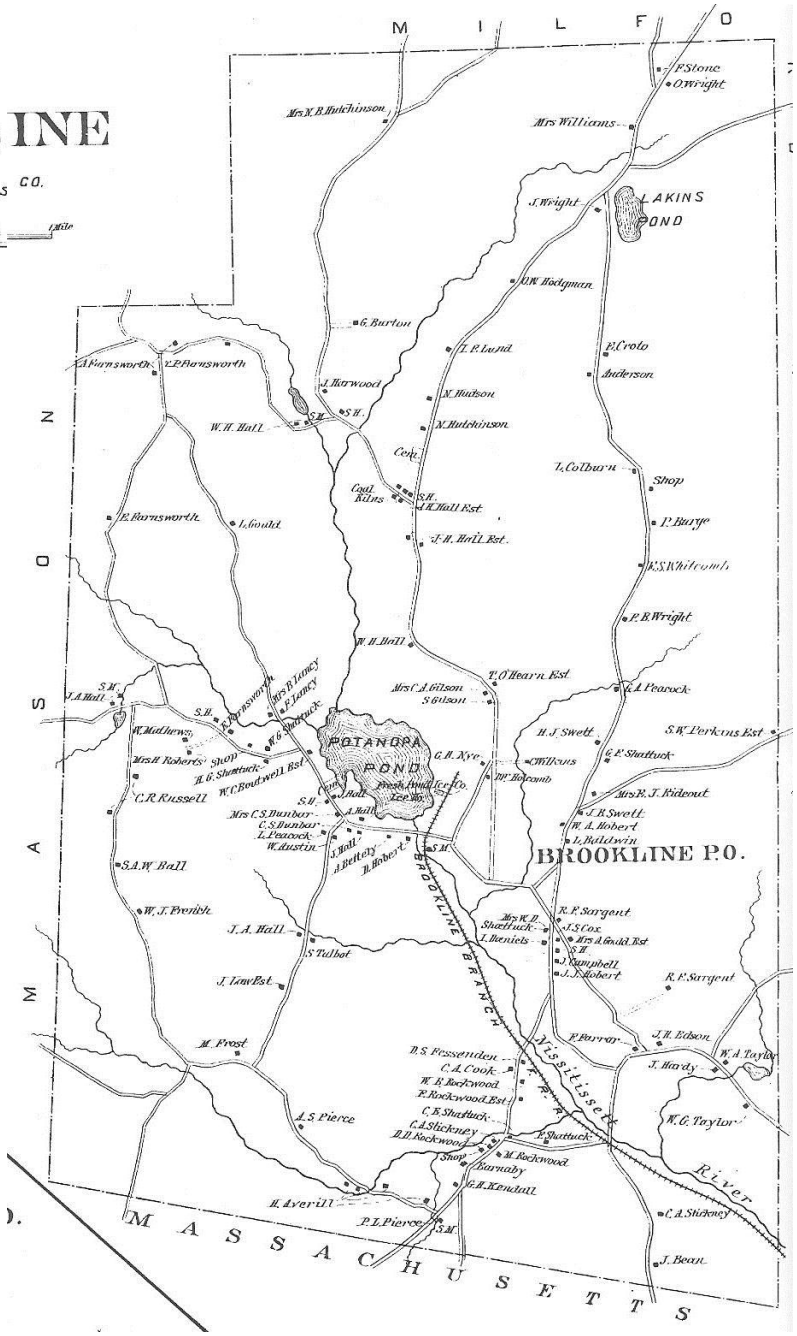
SECTION 1—INTRODUCTION

"At the date of the incorporation of Raby [Brookline] there were within its limits only two laid out and legally established highways. 'The Great Road', so called, leading from Pepperell, Mass., entered the town on its east side and, continuing on through its territory in a westerly direction, crossed the Nissitisset river… from whence it extended to Mason and on through the southern border towns of the state, until it terminated at Hinsdale on the Connecticut river.

At this time and for many subsequent years this road was the principal route in New Hampshire for travel and traffic between these border towns and Boston. So far as its location in Brookline is concerned, it remains today practically the same as in the beginning.

The second of these laid out highways was that known at the present time as the Proctor Hill Road to Hollis. Its location today is also practically the same as in the beginning. From Raby [Brookline] this latter road extended on in a southwest direction via Townsend Hill to Townsend, Mass.



1892 Map of Brookline *(Brookline Historical Society)*

The majority of the other roads in town at that time were mere bridle paths; suitable only for horseback riders or, in some instances, for the passage of the lumbering ox wagons then in use...

These bridle paths, as they were called, although many of them were mere foot trails between the log cabins of the settlers, were to be found leading in all directions through the dense forest growth which then covered the entire surface of the township. In subsequent years some of them were laid out and accepted as public highways, and are in use as such at the present time. Others continued to be used for

public travel for many years or until, by the construction of other more direct and therefore more convenient routes between the points which they connected, they gradually passed into disuse."[1]

The purpose of the Transportation Chapter is to develop strategies for an efficient and safe transportation system that will preserve the community's character and accommodate orderly growth. The above passage from Edward Parker's 1914 book on the history of Brookline reflects similar concepts used today in transportation planning. "Great Roads" connected rural communities to the large cities and smaller "bridal paths" were used for local travel within a community. The development of new infrastructure was designed to provide "more direct and therefore more convenient routes between the points which they connected."

While some components of the transportation system as it was a century ago are no longer in use – Parker mentions the railroad and its stations in "the village and South Brookline" – it is easy to see from the 1892 map that many of the primary roads still in use today were planned over a century ago. With continued proper planning, improvements made today will still be effective well into the future.

SECTION 2— TRANSPORTATION VISION

Several transportation studies have been conducted in Brookline in recent years, including: NH Route 13 Access Management Study (2006); NH Route 130 Corridor Study (2006); and Vision Plan for NH Routes 13 and 130 (2008). Surveys and public information sessions conducted for these studies, and a Master Plan Survey conducted in 2010, have consistently shown that maintaining "a small town atmosphere" and "rural character" are very important to the residents of Brookline.

The transportation studies listed above document that Brookline residents have concerns about traffic and speeding vehicles, truck volumes in the downtown area, and the safety of several intersections. The 2010 Master Plan Survey showed that road improvements are not a primary concern and, in general, roads are considered a strength to Brookline's economic development. During a Master Plan Visioning Forum held in 2010, participants in a Community Design session stated they felt the road system within Brookline provided the necessary connections to destinations both within and outside of the Town; no significant issues were found with southerly travel to Massachusetts or northerly travel to Milford and NH Route 101, nor with easterly travel to Hollis and Nashua (westerly travel was not discussed as the primary destinations for participants in the session were not west of Brookline). The 2010 Master Plan Survey asked a similar question: "Should the town of Brookline encourage connectivity rather than dead ends in its road design and layout?" Of the 96 responses, 38 said "Yes," 38 said "No," and 20 had no opinion.

While the 2010 Master Plan Survey indicated that residents thought roads are considered a strength to Brookline's economic development, it should be noted that in the same survey, residents expressed concern about the lack of transportation options within the Town and region. When asked what transportation options residents would like to see maintained or improved, non-motorized options, such

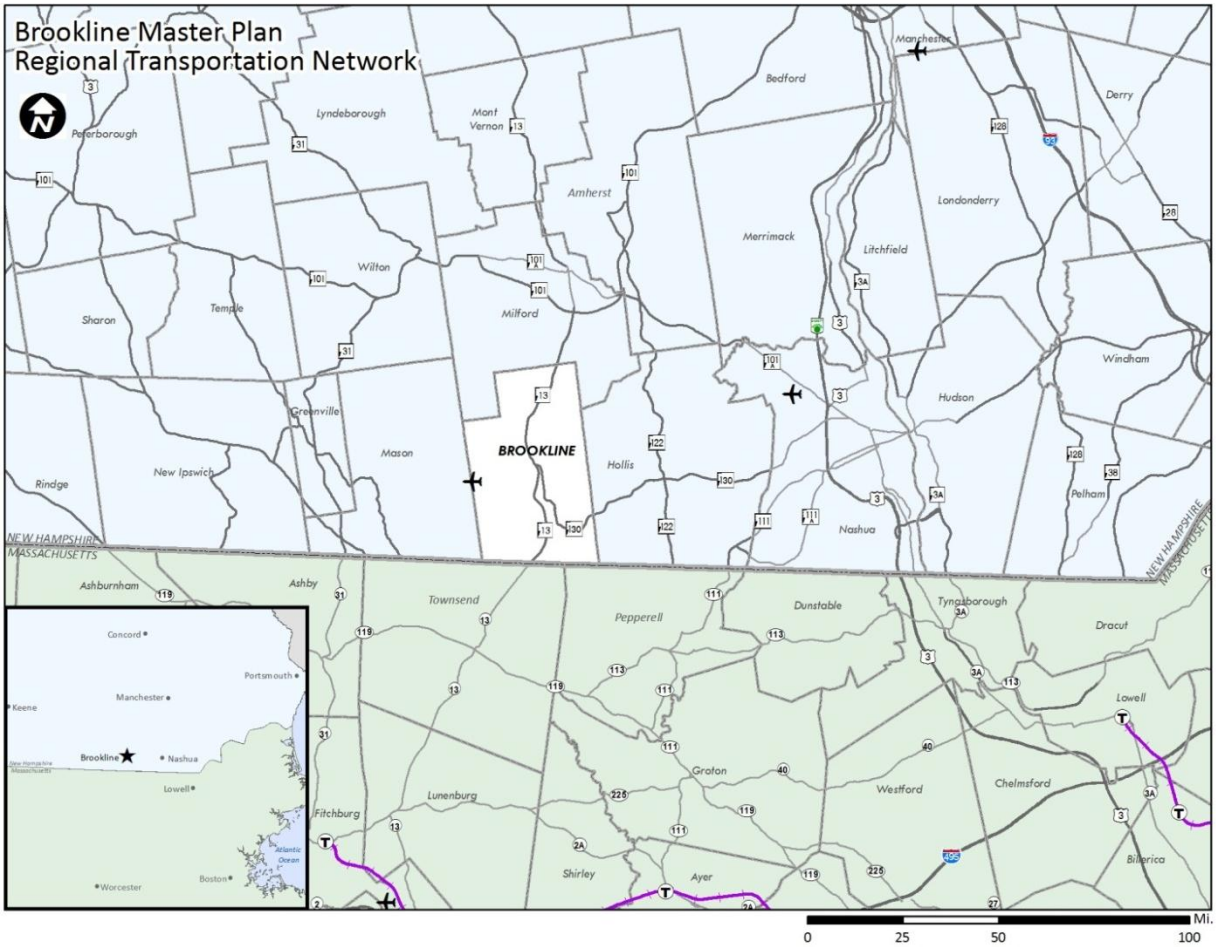
[1] Edward E, Parker, History of Brookline, Formerly Raby, Hillsborough County, NH, with Tables of Family Records and Genealogies (Town of Brookline, New Hampshire, 1914) 130-131

as pedestrian and bicycle amenities, ranked well above motorized options, such as rail and public bus service.

Further supporting the desire for non-motorized travel options, survey responses to transportation-related questions developed for the Vision Plan and the Master Plan highlighted the importance of maintaining and improving pedestrian and bicycle facilities throughout Town, especially near the schools and recreation facilities including Lake Potanipo. In 2008, the Town successfully applied for federal Safe Routes to Schools funds that were used to construct sidewalks in front of the Richard Maghakian Memorial School (RMMS) and Captain Samuel Douglass Academy (CSDA) in 2010. The development of a Sidewalk and Trail Connection Plan in August 2009 was recommended in the Vision Plan and further documents the Town's commitment to improved amenities that support a walkable Town Center, encourage non-motorized travel, and provide healthy ways for residents and visitors to enjoy the community's facilities and natural landscapes that attracted them to Brookline.

SECTION 3—EXISTING TRANSPORTATION NETWORK

There are approximately 63 miles of maintained public roads in Brookline. The major north/south route is NH State Route 13. NH 130 provides the primary easterly access from the center of Brookline, and Mason Road and North Mason Road provide the primary routes to the west.



3.1 ~ Highway Classification

Roads and highways are classified by the NH Department of Transportation (NH DOT) according to federal functional class and state legislative class. A Federal Functional Class is assigned to all public roads using Federal Highway Administration guidelines and is used to determine which roads are eligible for federal-aid funds. State legislative class is defined by RSA 229 – 231 and is used to determine responsibility for construction, reconstruction, and maintenance, as well as eligibility for use of state-aid funds.

Federal Functional Classification

Federal functional classification is the process by which streets and highways are grouped into classes or systems, according to the type of service they are intended to provide. It reflects a highway's balance between providing land access versus mobility. In general, roads are classified as urban or rural based on US Census data, then as arterials, collector roads, or local roads, based on function. According to the 2000 US Census, all of Brookline is classified as rural. Urban boundaries will be updated as a result of the 2010 US Census, but those updated boundaries will not be available until 2012.

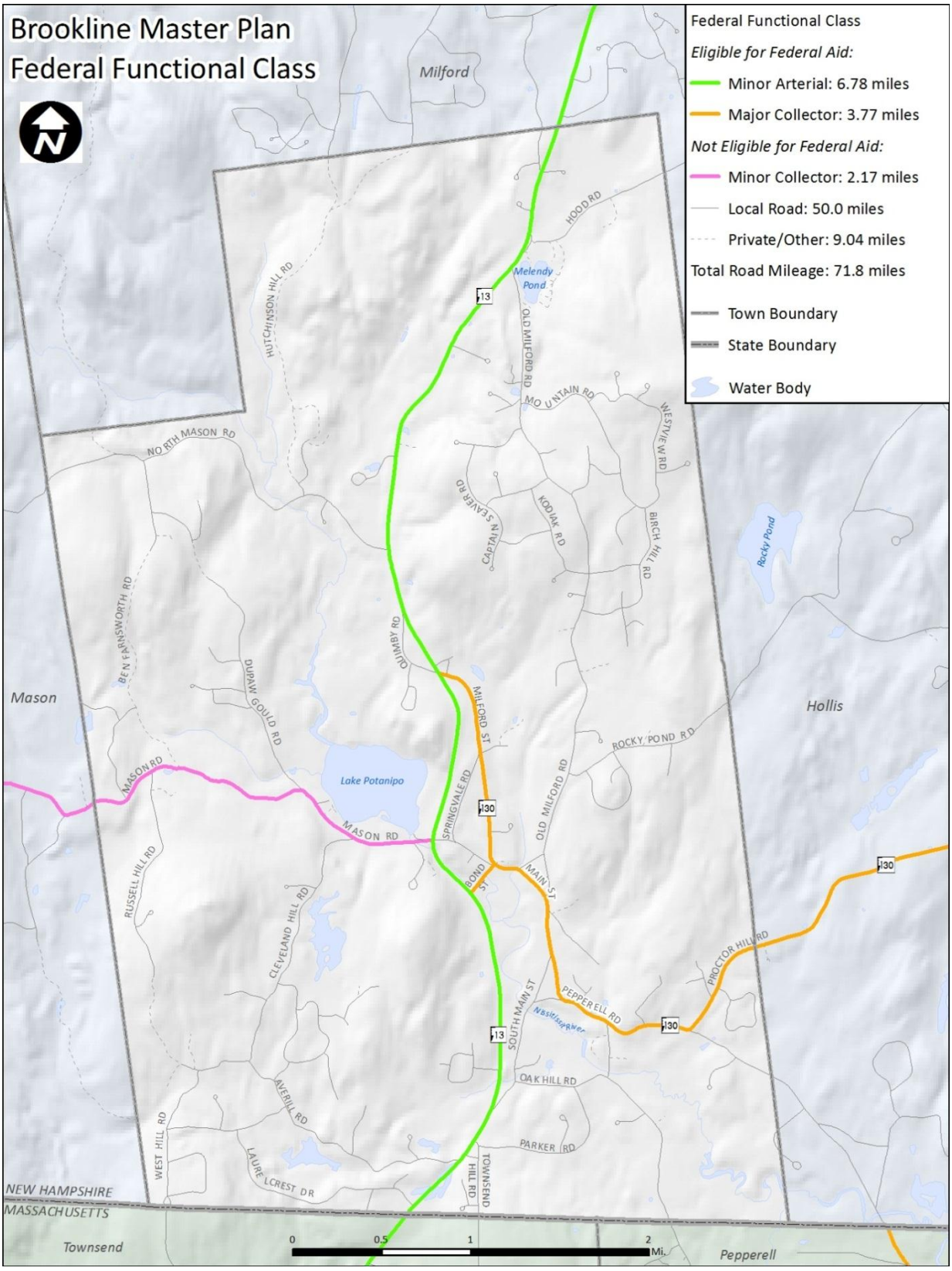
Table 1 provides a general description the functional classification system and the extent of each class in Brookline. Brookline is currently classified as rural, therefore specific urban classifications are not detailed in this section. Detailed classification concepts, definitions, and characteristics from the Federal Highway Administration are provided in Section 8 – References.

TABLE 1: Federal Functional Class of Roads in Brookline

Functional Class	Characteristics	Mileage
Principal Arterial	• Provides the highest level of mobility at the greatest travel speeds, allowing for through travel between major trip generators (larger cities, recreational areas, etc.). • Subcategories: Interstate, Freeway/Expressway, and Other Principal Arterial. • Eligible for federal-aid funds.	0 miles
Minor Arterial	• Provides access to geographic areas smaller than those served by the higher system by linking towns and cities together. • Can provide the highest level of mobility through rural areas without principal arterials, while providing important connections between the principal arterial and collector network in urban areas. • Provides intracommunity continuity, but does not penetrate identifiable neighborhoods. • Eligible for federal-aid funds.	6.78 miles

Functional Class	Characteristics	Mileage
Major Collector	• Provides service to any county seat not on an arterial route; to the larger towns not directly served by the higher systems; and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, recreational areas, etc. • Provides links to nearby larger towns or cities, or with routes of higher classifications. • Serves the more important intracounty travel corridors.	3.77 miles
Minor Collector	• Collects traffic from the local roadway network and distributes it to the major collector or arterial system. • Provides service to smaller municipalities. • Provides links to important small scale land use serving the local community.	2.17 miles
Local	• Comprises all highways not on the higher systems. • Provides the lowest level of mobility by accessing adjacent land use, serving local trip purposes, and connecting to higher order roadways.	50.0 miles
Total:		**62.7 miles**

FIGURE 1: Federal Functional Class of Roads in Brookline



Source: NH DOT, 2011

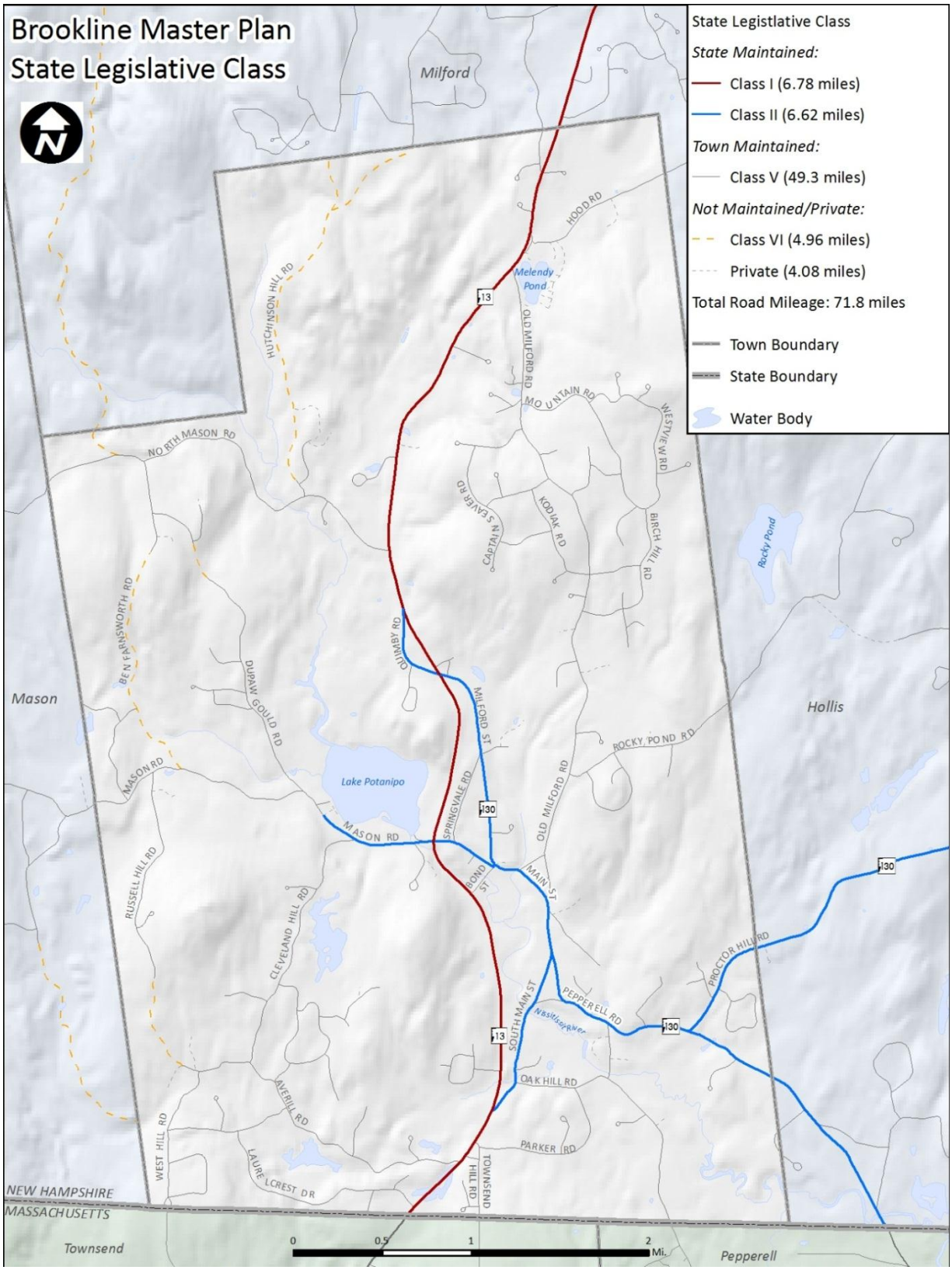
State Legislative Class

As previously stated, the state legislative classification system is defined by state law and is used to determine responsibility for construction, reconstruction, and maintenance, as well as eligibility for use of state-aid funds. Table 2 provides a general description the state legislative classification system and the extent of each class in Brookline. Section 8 – References contains detailed information provided from the NH DOT on the state classification of highways**.**

TABLE 2: State Legislative Class of Roads in Brookline

Legislative Class	Characteristics	Mileage
Class I	• Consists of all existing or proposed highways on the primary state highway system. • Maintained by the State.	6.78 miles
Class II	• Consists of all existing or proposed highways on the secondary state highway system. • Maintained by the State.	6.62 miles
Class III	• Consists of all such roads leading to and within state parks and reservations. • Maintained by the State.	0 miles
Class IV	• Consists of all highways within the compact section of cities and towns listed in RSA 229:5, V. (Urban Compacts).	0 miles
Class V	• Consist of all other traveled highways that the town or city has the responsibility to maintain.	49.3 miles
Class VI	• Consist of all other existing public ways, including highways subject to gates, and highways not maintained in suitable condition for travel for five years or more.	4.96 miles
	Total maintained (excluding Class VI):	**62.7 miles**
	Total including Class VI:	**67.7 miles**

FIGURE 2: State Legislative Class of Roads in Brookline



Source: NRPC, 2011

3.2 ~ Bridges, Culverts and Catch Basins

Bridges are defined by Federal regulations as:

> "A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening." *(23 CFR 650 Subpart C - National Bridge Inspection Standards, § 650.305 - Definitions*, *http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi)*

New Hampshire also has its own definition for a bridge in RSA 234:

> In this chapter, "bridge'' means a structure, having a clear span of 10 feet or more measured along the center line of the roadway at the elevation of the bridge seats, spanning a watercourse or other opening or obstruction, on a public highway to carry the traffic across, including the substructure, superstructure and approaches to the bridge. For purposes of qualification of bridge aid under this subdivision, but not applicable to RSA 234:4 or RSA 234:13, the term bridge shall include combination of culverts constructed to provide drainage for a public highway with:
>
> I. An overall combined span of 10 feet or more; and
> II. A distance between culverts of 1/2 the diameter or less of the smallest culvert.
>
> (Title XX – Transportation, Chapter 234 - Bridges and Bridge Aid, §234:2, http://www.gencourt.state.nh.us/rsa/html/XX/234/234-mrg.htm)

NH DOT maintains an inventory of both federal and state bridges, i.e., structures greater than 10 feet long. Culverts or other structures less than 10 feet long are not included in that inventory. There are thirteen bridges in Brookline included in the inventory, all of which are open to vehicular traffic. Five of the bridges are owned by the Town of Brookline, with the remaining eight bridges owned by the State of New Hampshire. Bridge inventory data published by the New Hampshire Department of Transportation (NH DOT) for the thirteen bridges in Brookline are summarized in Table 3. Culverts identified in 2011 by the Town of Brookline's Hazard Mitigation Plan Committee as being of concern due to flooding potential are shown on Figure 3. It should be noted that this is not a complete inventory of all the culverts in Brookline, estimated to be in the "hundreds" by the Road Agent. In 2010, many culverts were improved - in particular, those on Hood Road, Mason Road and North Mason Road. Culverts are assessed yearly, with improvements made on an as needed basis.

Bridges (state and municipal) are inspected at least once every two years by the NH DOT in accordance with the Federal Highway Administration (FHWA) National Bridge Inspection Standards (NBIS). The inspection data is maintained by the FHWA in their National Bridge Inventory (NBI) database. A bridge is

considered to be "structurally deficient" and is placed on the "Red List" if one or more of its structural elements (girder, stringer, deck, pier, abutment, etc.) have an inspection rating of 4 or less, with 9 being a "perfect" bridge and 0 being a "closed" bridge. State-owned Red List bridges are inspected every six months, and municipal-owned Red List bridges are inspected every twelve months. A red-listed bridge is not unsafe or likely to collapse; the hands-on inspections identify unsafe conditions and, if the bridge is determined to be unsafe, the structure is closed. "Functionally obsolete" bridges are those that were built to older design standards no longer used today, and generally do not have adequate lane widths, shoulder widths, or vertical clearances to meet current traffic demands. Structures that do not carry vehicular traffic or are less than or equal to 20 feet in length are not part of the NBI system and therefore, the NBI rating is not applicable.

As shown in table below and on Figure 3, Brookline has one bridge on the Municipal Red List, located on Dupaw Gould Road over Lancy Brook. In 1986, this bridge was washed out following a flood event and was rebuilt with the assistance of NH DOT in 1987. The bridge was last inspected by NH DOT in September 2010 and is considered "structurally deficient" based on inspection ratings. It is reported to have a few cracks in its metal pipe (aluminum) construction that have existed since near the time it was reconstructed and have not shown signs of worsening. There currently is no plan for rehabilitating or replacing the structure. According to the most recent traffic count conducted on the bridge in 2008, the average annual daily traffic over the bridge is 390 vehicles.

Several municipal and state bridges are posted with an E-2 load restriction, as shown in Table 3. The E-2 designation excludes all combination and single unit certified vehicles from crossing a specific bridge. Certified Vehicles are those that have been permitted by the State to exceed the load limit (up to a designated weight) set within their specified weight class. NH DOT calculates a safe load capacity for each bridge they inspect (which includes all state and municipal bridges) and recommends a weight limit posting to the owner of the bridge. However, as municipalities are entirely responsible for the use and maintenance of municipal bridges, it is up to a municipality to determine if the bridge should be considered for allowing Certified Vehicles to cross them, and to post load restrictions based on that determination.

An inventory of catch basins provided by the Road Agent is included as Table 4.

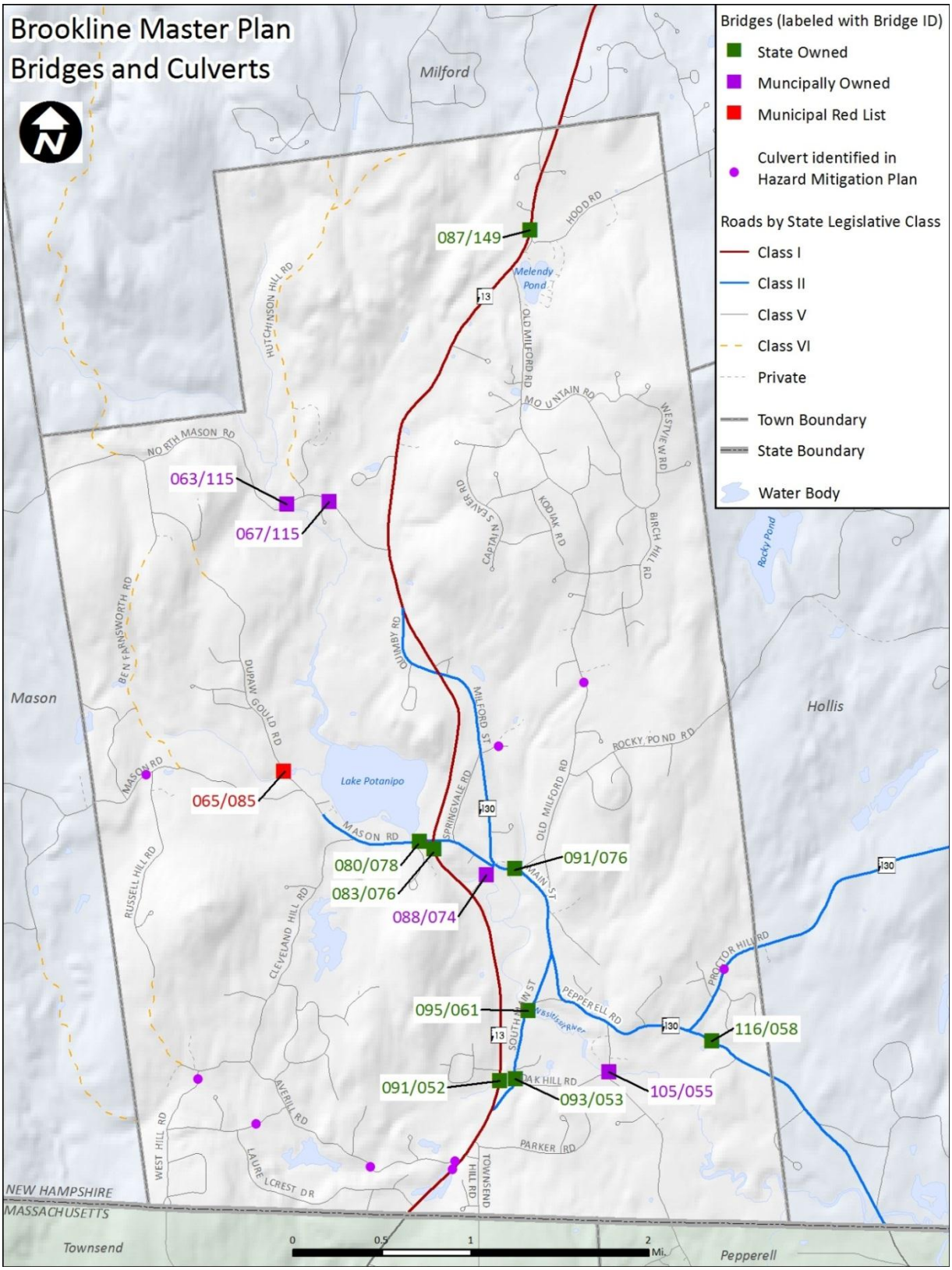
TABLE 3: Bridges in Brookline

Bridge ID	Bridge	Owner	Year Built/ Reconstructed	NBI Rating Status	Type	Length (feet)	Average Daily Traffic (Year)
063/115	North Mason Road over Spaulding Brook	Municipality	1988	Not Deficient No Posting Required	I-Beams with Concrete Deck	47	790 (2008)
065/085	Dupaw Gould Road over Lancy Brook	Municipality	1987	Structurally Deficient **Municipal Red List** No Posting Required	Metal Pipe	22	390 (2008)
067/115	North Mason Road over Mitchell Brook	Municipality	1945 (widened in 1992)	Not Applicable E2 Posting	Concrete Slab	14	790 (2008)
088/074	Bond Street over Nissitissit River	Municipality	1946	Not Deficient E2 Posting	I-Beams with Concrete Deck	45	1200 (2006)
105/055	Bohannon Bridge Rd over Nissitissit River	Municipality	1940/1998	Functionally Obsolete No Posting Required	Prestressed Voided Slabs	33	470 (2008)
080/078	Mason Road over Nissitissit River	NH DOT	1932	Functionally Obsolete E2 Posting	Concrete Rigid Frame	57	2700 (2009)
083/076	NH 13 over Nissitissit River	NH DOT	1947	Not Deficient No Posting Required	Concrete Arch	31	5500 (2008)
087/149	NH 13 over Bela Brook	NH DOT	1900/1947	Not Applicable E2 Posting	Concrete Box	10	8400 (2009)
091/052	NH 13 over Wallace Brook	NH DOT	1947/1982	Not Applicable No Posting Required	Concrete Box	16	5800 (2009)

Bridge ID	Bridge	Owner	Year Built/ Reconstructed	NBI Rating Status	Type	Length (feet)	Average Daily Traffic (Year)
091/076	NH 130 Over Store Brook	NH DOT	1935	Not Deficient E2 Posting	Concrete Rigid Frame	23	4100 (2008)
093/053	S. Main Street over Wallace Brook	NH DOT	1928	Not Applicable No Posting Required	Concrete Slab	16	2800 (2008)
095/061	S. Main Street over Nissitissit River	NH DOT	1931/1993	Functionally Obsolete E2 Posting	Concrete Rigid Frame	28	2800 (2008)
116/058	Pepperell Road over Rocky Pond Brook	NH DOT	1931	Not Applicable No Posting Required	Concrete Rigid Frame	12	1500 (2008)

Source: NHDOT Bridge Summary Report, March 31, 2011

FIGURE 3: Bridges and Culverts in Brookline



Source: NH DOT, 2011

TABLE 4: Catch Basins in Brookline

Number	Road	Location Description (# if more than one)
1	Bond Street	In front of Fire Station
2	Bond Street	Across from Fire Station
3	Bond Street	House Number 5
4	Bond Street	House Number 6
5	Meeting House Hill Road	In front of Town Hall
6	Meeting House Hill Road	In front of Town Hall
7	Main Street	Behind Library
8	Elm Street	Intersection of Elm Street and NH 130
9	Elm Street	Base of 4 Elm Street
10	Old Milford Road	35 Old Milford Road
11	Old Milford Road	116 Old Milford Road
12	Rocky Pond Road	7 Rocky Pond Road
13	Rocky Pond Road	12 Rocky Pond Road
14	Rocky Pond Road	15 Rocky Pond Road
15	Rocky Pond Road	Between 15 Rocky Pond Road and Hobart Hill Road
16	Rocky Pond Road	Between 15 Rocky Pond Road and Hobart Hill Road
17	Rocky Pond Road	Hobart Hill Road Intersection
18	Rocky Pond Road	25 Rocky Pond Road
19	Rocky Pond Road	Across from 25 Rocky Pond Road
20	Rocky Pond Road	Heifer Intersection
	Rocky Pond Road	Between Heifer and 34 Rocky Pond Road (2)
	Rocky Pond Road	Between 34 and 33 Rocky Pond Road
21	Heritage Circle	In front of 3 Heritage Circle
22	Kodiak Road	18 Kodiak Road

Number	Road	Location Description (# if more than one)
23	Mosher Drive	At intersection of Old Milford Road
24	Ruonala Road	At intersection of NH 13
25	Post Office Drive	2 Post Office Drive
26	Post Office Drive	In Brookline Safety Complex
27	Post Office Drive	In Brookline Safety Complex
28	Post Office Drve	6 Post Office Drive
29	Commercial Lane	In Brookline Safety Complex
30	Commercial Lane	On the road
31	RMMS	On west side of building
32	RMMS	On back side strip of pavement
33	RMMS	On back side strip of pavement
34	RMMS	On back side strip of pavement
35	RMMS	On back side strip of pavement
36	Frances Drive	4 Frances Drive
37	Frances Drive	50 feet up and right of 4 Frances Drive
38	Cleveland Hill Road	At intersection Of Mason Road
39	Cleveland Hill Road	7a Cleveland Hill Road
40	Townsend Hill Road	At intersection of NH 13
41	Townsend Hill Road	At intersection of Parker Road
42	CSDA	Both sides of entrance (2)
43	CSDA	100 feet up on both sides (2)
44	CSDA	Left side of parking lot edge (3)
45	CSDA	In middle of grass in parking lot
46	CSDA	In back in grass of dirt road (2)
47	Cross Road	At intersection of South Main Street

Number	Road	Location Description (# if more than one)
48	Lorden Lane	At Intersection of NH 13 (2)
49	Lorden Lane	100 feet up from NH 13 (2)
50	Sergeant Road	At intersection of Main Street
51	Russell Hill Road	Right before intersection of Quentin Drive
52	Mason Road	At entrance to Camp Tevya
53	Steam Mill Hill Road	3 Steam Mill Hill Road
54	Steam Mill Hill Road	Across from 3 Steam Mill Hill Road
55	Steam Mill Hill Road	4 Steam Mill Hill
56	Steam Mill Hill Road	6 Steam Mill Hill
57	Steam Mill Hill Road	8 Steam Mill Hill
58	Steam Mill Hill Road	Top of hill
59	Steam Mill Hill Road	Between 6 and 8 Steam Mill Hill Road
60	North Mason Road	On Bridge 1 at Transfer Station (2)

Source: Road Agent, Town of Brookline, 2011

3.3 ~ Traffic Volumes

Traffic volume data for the Town of Brookline are compiled from several sources. The Nashua Regional Planning Commission (NRPC) maintains an ongoing traffic count program for validating the region's traffic model. In addition, NRPC collects traffic count data for the New Hampshire Department of Transportation (NH DOT) in accordance with federal guidelines under the Federal Highway Performance Monitoring Program (HPMS).

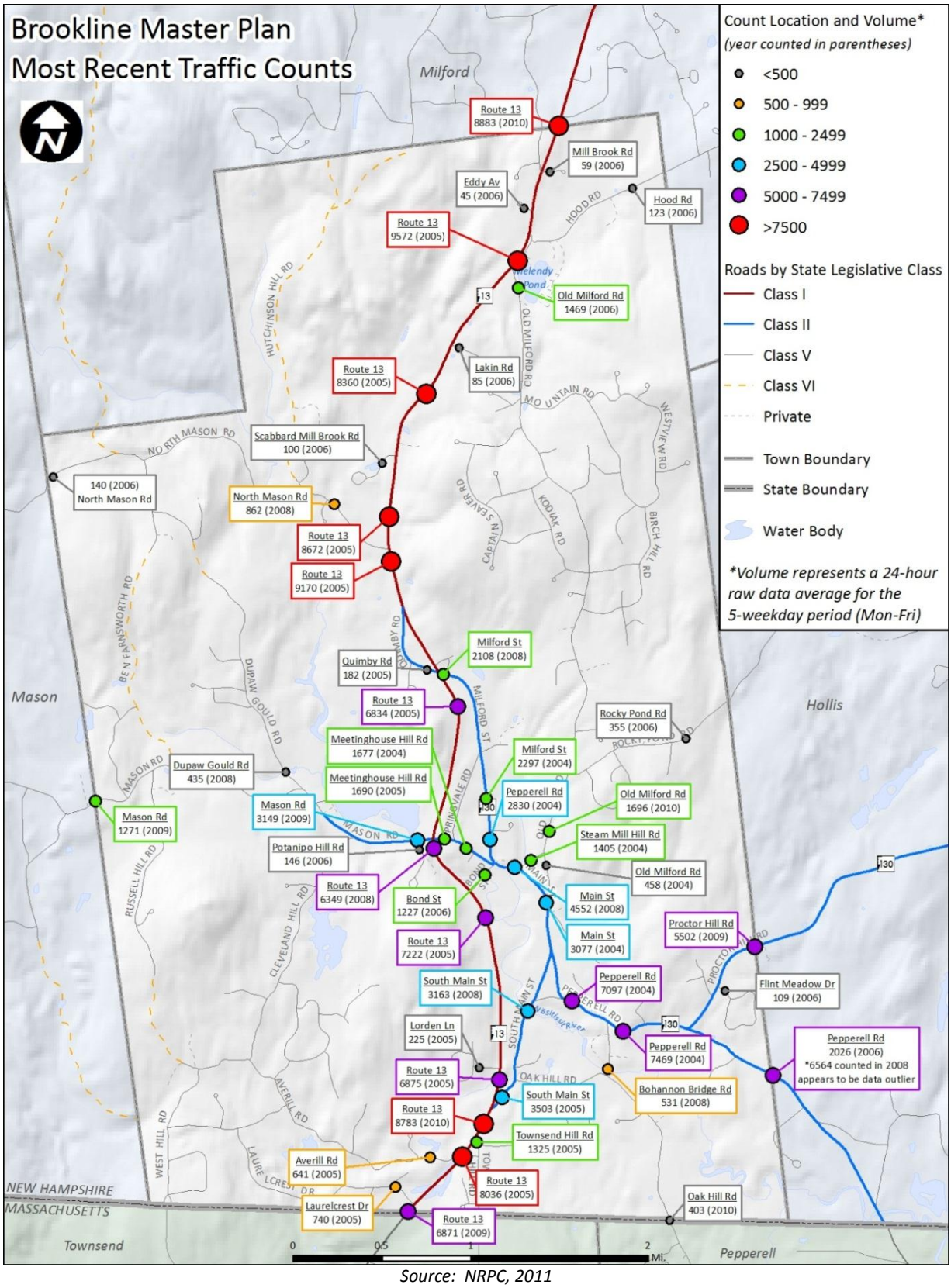
Figure 4 displays locations in Brookline where traffic data has been collected by the NRPC. Each site is labeled with the most recent traffic count collected, with the year of the data collection in parentheses. Traffic volumes shown on the map range from a low of 45 on Eddy Avenue (collected in 2006) to a high of 9,572 on NH 13 near Melendy Pond (collected in 2005). The data indicate that the most heavily traveled road in Brookline is NH 13, which runs north-south through the Town from the Massachusetts state line to Milford. NH State Route 130 (NH 130), which provides access to Hollis and Nashua, is also one of the more heavily traveled routes, with highest volumes seen at the eastern end of the route near the Hollis town line and decreasing volumes west of the Cross Street intersection. South Main Street, which provides a connection at the southern end of NH 13 to NH 130, also carries a moderate volume of traffic, similar to the volumes seen on NH 13 west of Cross Street.

Mason Road provides access to Lake Potanipo from NH 13 and continues west to Mason; traffic volumes at the Lake's boat launch are moderately high (3,149 in 2009) with volumes decreasing by over fifty percent west of the Lake to 1,271 (2009) at the Mason town line. Old Milford Road plays an important role in collecting and distributing traffic in the Town to residential areas west of NH 13, as shown by the traffic volumes displayed on Figure 4.

Up until 2004, the NH DOT maintained a permanent traffic recorder on NH Route 13 just north of Old Milford Road. Unfortunately, that location is no longer an active permanent count station, so an analysis of historical growth by year at this site is not possible. Therefore, Figure 5 displays Average Annual Daily Traffic (AADT) volumes for 2003 – 2009, which are published on the NH DOT website at http://www.nh.gov/dot/org/operations/traffic/documents.htm. AADT is a basic measure of traffic demand for a roadway and represents the volume of traffic travelling in both directions. As stated above, NRPC provides traffic count data to the NH DOT, who then calculates the AADT by applying correction factors to raw data to account for weekday and seasonal variations in traffic volumes.

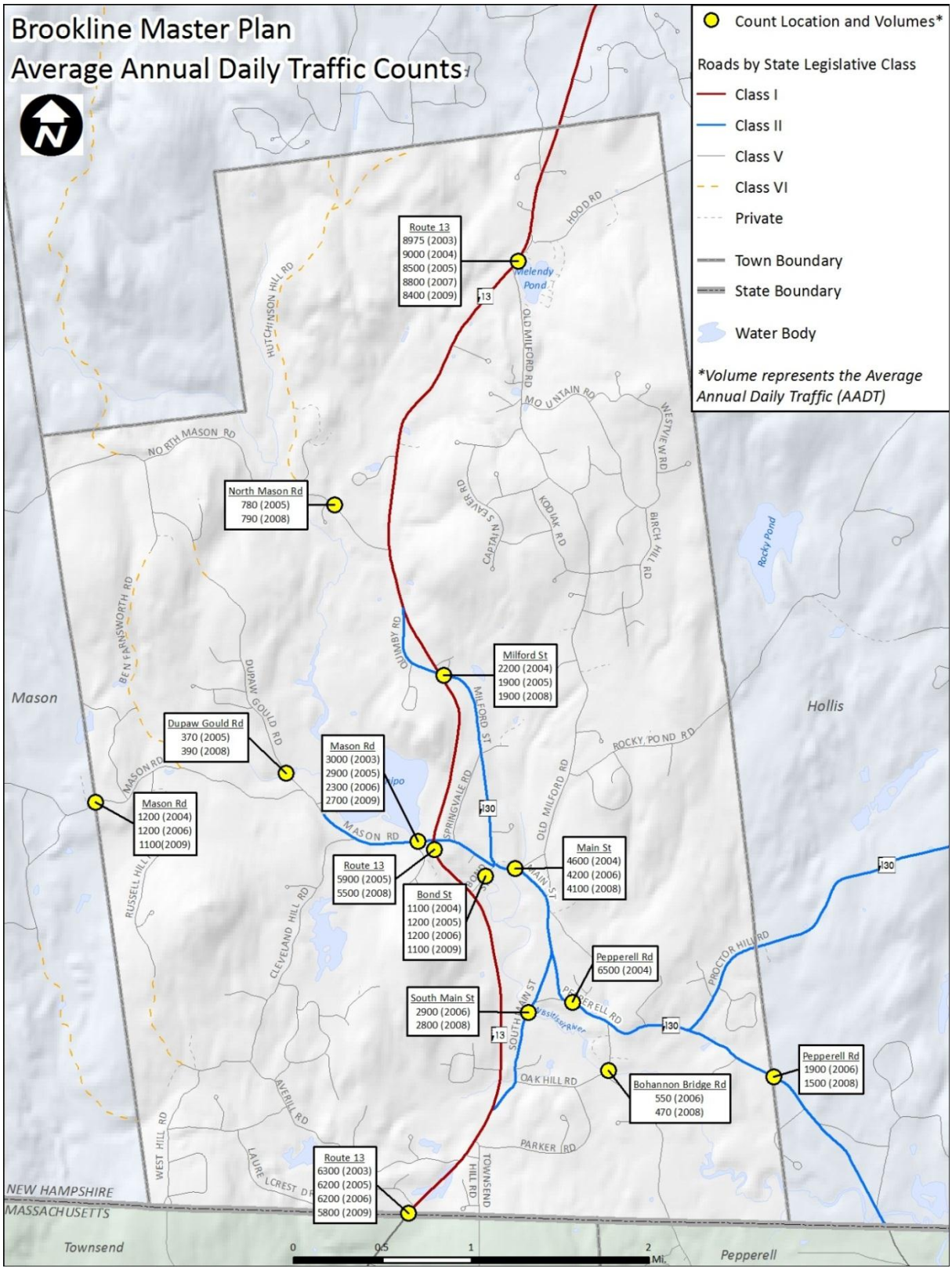
Of the thirteen sites for which multiple AADT volumes between 2003 and 2009 have been calculated, only two show slight increases in volumes, with the remaining sites showing decreases. This trend of decreasing traffic volumes has been documented throughout the state and nation, as many areas have seen a reduction in travel due to a variety of factors, including increased fuel prices and unemployment rates.

FIGURE 4: Traffic Count Sites in Brookline



Source: NRPC, 2011

FIGURE 5: Average Annual Daily Traffic Counts in Brookline



Source: NH DOT, 2011

Highway Capacity Analysis

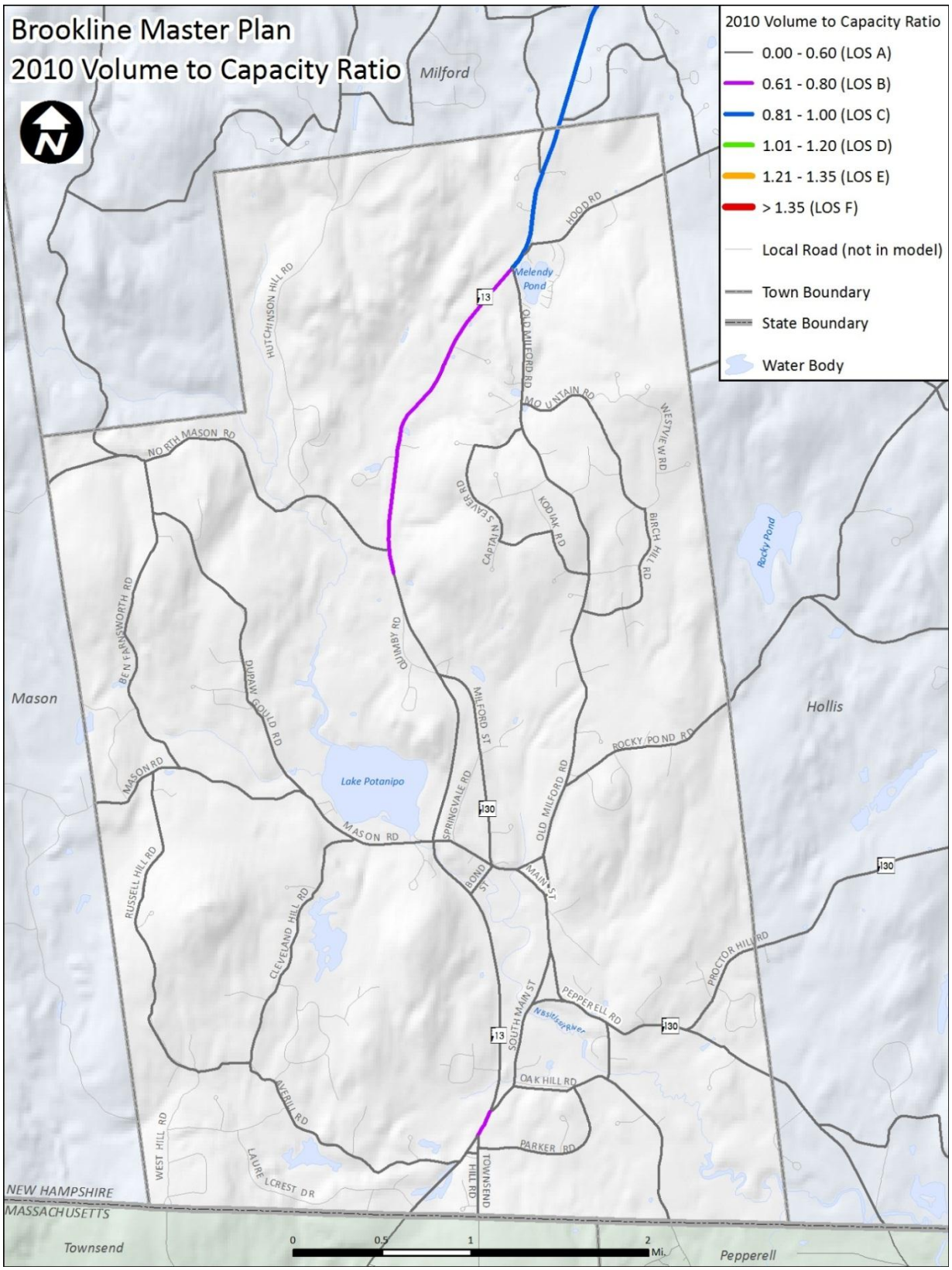
The NRPC's Travel Demand Model was used to assess the capacity of Brookline's major highways and roads. The model was developed on a region-wide basis as a tool to examine current and forecasted traffic and to determine future highway needs. The model utilizes land use development as the determinant for trip generation and then distributes and assigns the traffic on the road network based on a mathematical gravity model. Land use determines the production and attraction of vehicle trips for each traffic analysis zone, while the gravity model determines the paths of least resistance between the zones when assigning traffic to specific roads. The model is validated utilizing field counts from automatic traffic recorders.

Volume to capacity ratio is a formula expressed as the amount of existing traffic on a road divided by the theoretical carrying capacity of that road. The theoretical capacity takes into account the number of lanes, type of access control, and urban/rural classification of a roadway. Level of service (LOS) is a qualitative measure that characterizes operating conditions in terms of traffic performance measures related to travel speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The level of service (LOS) ranking categories range from LOS "A" (least congested) to LOS "F" (most congested).

- Level of Service "A" - Represents free flow operating conditions. Individual users are virtually unaffected by others.
- Level of Service "B" - Represents stable flow conditions with other traffic in the stream becoming noticeable. The freedom to select desired speeds is still unaffected.
- Level of Service "C" - Represents stable flow but marks the beginning of increases in the formation of platoons of vehicles.
- Level of Service "D" - Represents high density but stable flow. Freedom to maneuver and speeds are highly restricted.
- Level of Service "E" - Represents operating conditions at or near capacity. Congestion level and delays are high.
- Level of Service "F" - Represents forced flow conditions with lengthy queues and very long delays.

Figure 6 displays Travel Demand Model outputs for 2010 volume to capacity ratios. The section of NH 13 north of Old Milford Road to the Milford town line is at Level of Service "C". Additionally, the segments of NH 13 between Old Milford Road and North Mason Road, and between South Main Street and Townsend Hill Road are at Level of Service "B." All other roads are Level of Service "A."

FIGURE 6: 2010 Volume to Capacity Ratios



Source: NRPC, 2011

Intersection Capacity Analysis

Included in the 2006 NH 13 Access Management Study is an analysis of the Level of Service of critical intersections based on peak hour turning movement counts collected in 2005. In summary, most of the intersections along NH 13 in Brookline exhibit relatively good LOS. Generally, the movements from the main line of NH 13 onto the minor streets are either "A" or "B." Most of the movements from minor street approaches onto NH 13 are LOS "B" or better. The exceptions are at the NH 13/South Main Street intersection and the NH 13/Mason Road/Meetinghouse Hill Road intersection, as shown in Table 5 below.

TABLE 5: Peak Hour Intersection Level of Service for NH 13

Location	Approach Level of Service	
	AM	PM
NH 13/Townsend Hill Road		
NH 13 – southbound	A	A
Townsend Hill Road – westbound	B	B
NH 13/South Main Street		
NH 13 – northbound	A	A
NH 13 – southbound	A	A
South Main Street – westbound	C	D
Liquor Store Plaza – eastbound	B	B
NH 13/Bond Street		
NH 13 – northbound	A	A
Bond Street – westbound	B	B
NH 13/Mason Road/Meetinghouse Hill Road		
NH 13 – northbound	A	A
NH 13 – southbound	A	A
Mason Road – eastbound	C	C
Meetinghouse Hill Road – westbound	B	B

Location	Approach Level of Service	
	AM	PM
NH 13/Old Milford Road		
NH 13 – southbound	A	A
Old Milford Road – westbound	B	B
NH 13/Milford Street/Quimby Road		
NH 13 – northbound	A	A
NH 13 – southbound	A	A
Quimby Road – eastbound	B	B
Milford Street – westbound	B	B
NH 13/North Mason Road		
North Mason Road – eastbound	B	B

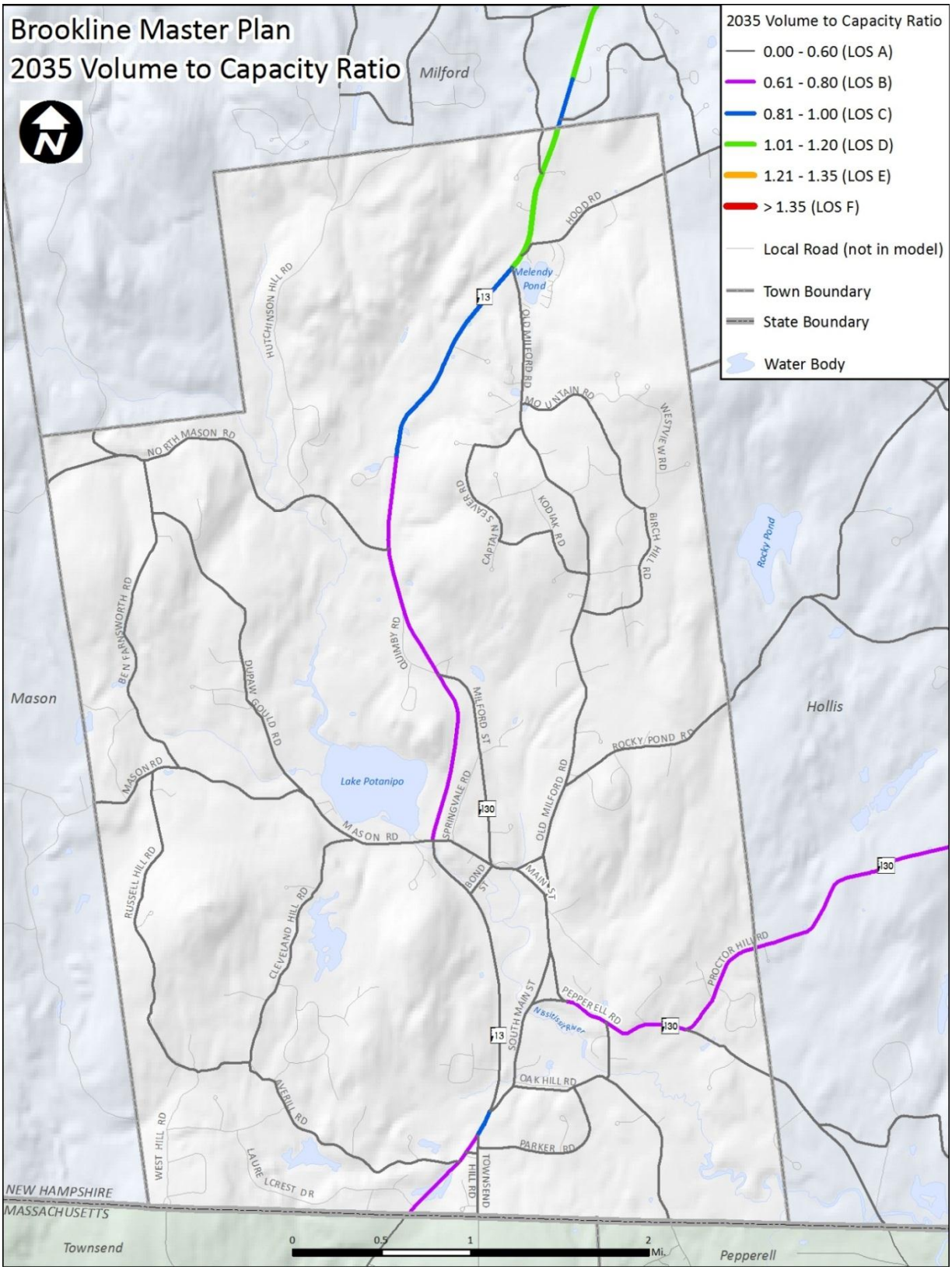
Future Traffic Volumes

Future traffic volumes on Brookline's major highways and roads were projected using NRPC's Travel Demand Model. Table 6 shows the model's forecasted traffic volumes and calculated Level of Service (LOS) for the year 2035 on major routes at the Town's borders and downtown on Main Street. Figure 7 displays Travel Demand Model outputs for 2035 volume to capacity ratios. The model outputs suggest that LOS along NH 13 near the Milford town line southerly to Old Milford Road will go from "C" to "D" over the next 25 years and the segment south of Old Milford Road will see an increase in traffic that will bring it from an LOS "B" to "C." The segment of NH 13 just south of South Main Street is also forecasted to see an increase in traffic that will bring the LOS "B" to LOS "C." Segments that are currently functioning at LOS "A" that will be at LOS "B" by 2035 include NH 130 to Cross Road and NH 13 from a point just south of South Main Street to the Massachusetts state line.

TABLE 6: Projected Traffic Volumes

Count Location	Year Counted	Volume	Projected 2035 Volume	% Change	Theoretical Capacity	Volume/ Capacity	Projected 2035 LOS
Main St west of Steam Mill Hill Rd	2008	4,552	4,812	6%	16,600	0.29	A
Mason Rd at Mason Town Line	2009	1,271	2,130	68%	17,000	0.13	A
Route 13 at State Line	2009	6,871	11,860	73%	16,600	0.71	B
Route 13 at Milford Town Line	2010	8,883	16,900	90%	16,600	1.02	D
Proctor Hill Rd at Hollis Town Line	2009	5,502	13,040	137%	16,600	0.79	B

FIGURE 7: 2035 Volume to Capacity Ratios



Source: NRPC, 2011

3.4 ~ Roadway Conditions

Pavement condition data from 2010 was obtained from the NH DOT's Pavement Management Section for state-maintained (Class I and II) roads and is displayed on Figure 8. The pavement condition is rated based on its Ride Comfort Index (RCI), which is calculated directly from the average pavement roughness measured in the left and right wheel paths of roadways. The data indicate that the majority of the Class I and II roads require some work (about 8 miles) and about 5 miles need major work, including all of South Main Street, Meetinghouse Hill Road, and Quimby Road, as well as Pepperell Road east of Proctor Hill Road, and most of the Class II portion of Mason Road. Main Street and Milford Street also have sections that are in need of major work, according to the NH DOT data. Less than one mile of Brookline's state-maintained roads require no work.

The 2010 – 2015 Capital Improvements Plan (CIP) for Brookline proposes approximately $60,000 per year for various road improvements. According to the CIP, approximately 1,000 feet of dirt road can be paved per year with the available funding. North Mason Road is being upgraded from a dirt road to a paved road; that upgrade should be completed by 2012. Hood Road is on schedule to be upgraded, beginning in 2013. Priorities for road upgrades are set based on the pattern of housing development.

Approximately $220,000 per year is expended on resurfacing local roads; with those funds, about three miles of paved roads are overlaid each year, depending on asphalt and construction costs. There are approximately 45 miles of paved roads in Brookline, meaning roads receive an overlay treatment every 15 years. A paving plan was developed in 2007 by rating all 45 miles of paved roads on a scale of one to fifteen, based on that 15-year paving cycle. Roads are assessed in the spring to determine if the plan needs adjustment based on pavement conditions.

The following locally-maintained roads in Brookline have been resurfaced over the last 5 years:

2010: Shattuck Lane, Oak Hill Road, Heritage Circle, Captain Seaver Road, Bear Hill Road, North Mason Road, Dupaw Gould Road, Cleveland Hill Road

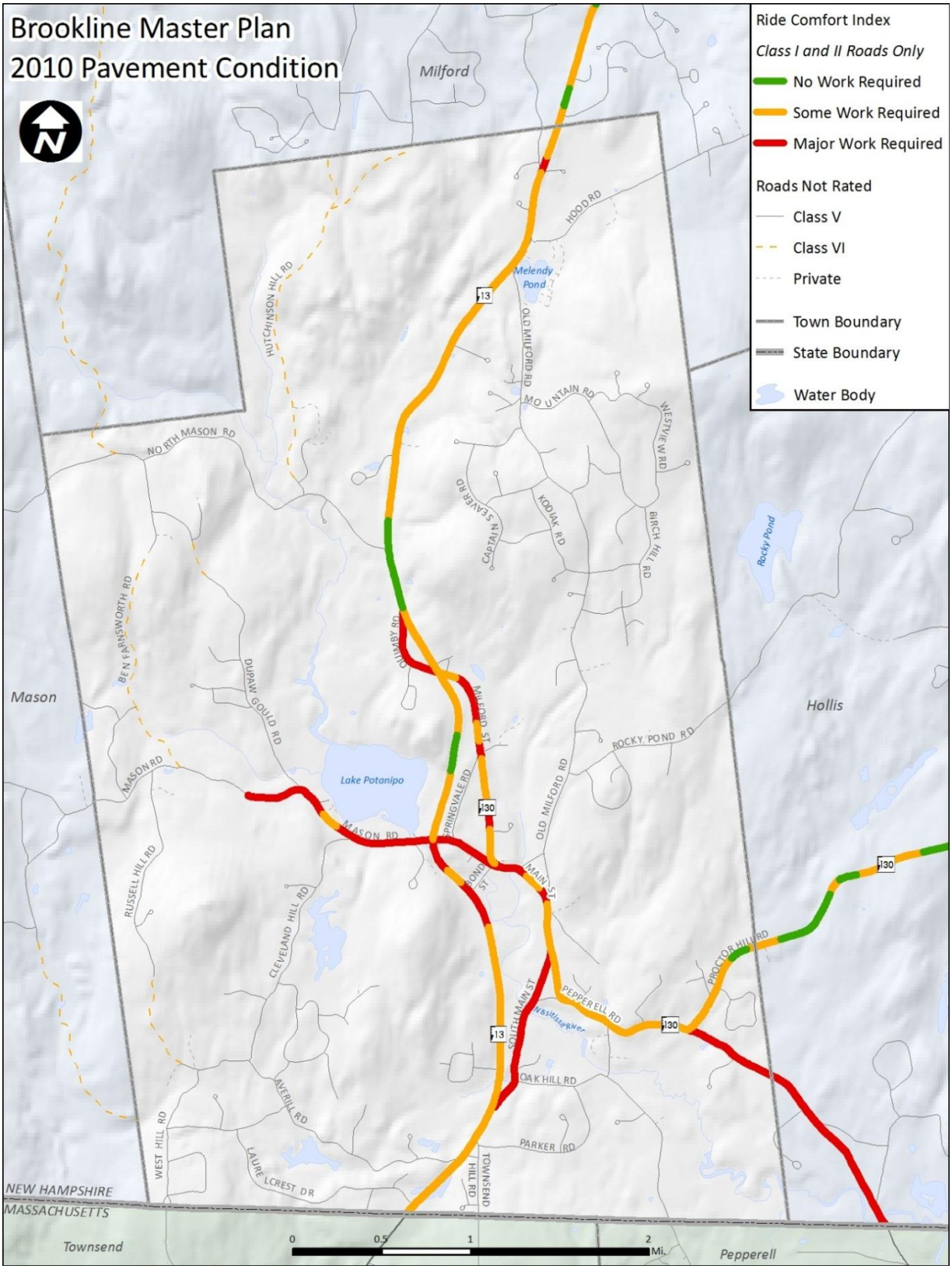
2009: Bond Street, Frances Drive, Muscatanipus Road, Captain Seaver Road, part of Old Milford Road, Bear Hill Road, Wadsworth Drive

2008: Cleveland Hill Road, Kodiak Road up to Senter Drive, Senter Drive, Mosher Drive

2007: Westview Road, Taylor Drive, Cross Road

2006: First 1,200' of Rocky Pond Road, Beaver Pond Drive, second half of Wallace Brook, one way of Milford Road, Elm Street, Hillside Drive, second half of Mountain Road

FIGURE 8: NH DOT Pavement Condition - 2010

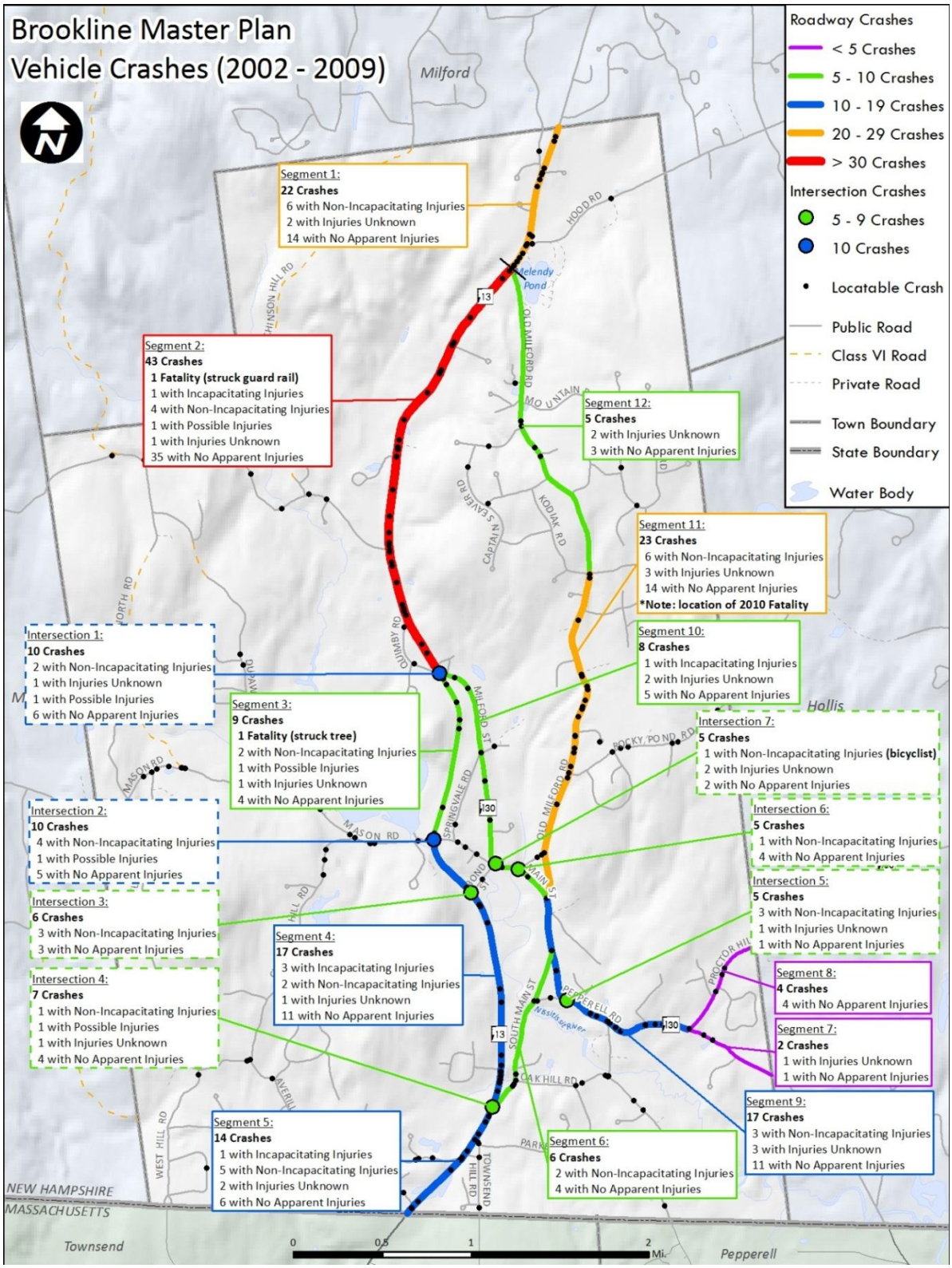


Source: NH DOT, 2011

3.5 ~ Motor Vehicle Crashes

Motor vehicle crash data from 2002 – 2009 was obtained from NH DOT, who receives the data from the Department of Safety for crashes with over $1,000 in damage. The data represent about 75% of all crashes; the remaining 25% of crashes are not locatable based on the information contained in the accident report. Locatable crashes that occurred on NH 13, NH 130, and Old Milford Road were reviewed and are summarized graphically on Figure 9 and in tabular form in Table 7. There was one fatality not displayed on Figure 9, which occurred in October 2004 on Laurelcrest Drive and involved a pedestrian, because it did not occur on one of the analyzed corridors. In addition, there was one fatality that occurred in 2010 and is not displayed in Table 7 because the NH DOT dataset only covered through 2009; the fatal crash involved a single-vehicle that struck a tree.

FIGURE 9: Reportable and Locatable Vehicle Crashes between 2002 and 2009



Source: NH DOT, 2011S

TABLE 7: Reportable and Locatable Vehicle Crashes between 2002 and 2009

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Intersection 1	NH 13	NH 13 and Milford Street/ Quimby Road	10	Collision	Other Motor Vehicle	5			1		1	3
				Collision	Fixed Object - Utility Pole	1			1			
				Collision	Fixed Object - Tree	1				1		
				Non-Collision	Overturn	1						1
					No Code	2						2
Intersection 2	NH 13	NH 13 and Mason Road/ Meetinghouse Hill Road	10	Collision	Other Motor Vehicle	8			4	1		3
				Collision	Fixed Object - Rock/Sideslope	1						1
				Non-Collision	Other	1						1
Intersection 3	NH 13	NH 13 and Bond Street	6	Collision	Other Motor Vehicle	5			3			2
				Non-Collision	Other	1						1

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Intersection 4	NH 13	NH 13 and South Main Street	7	Collision	Other Motor Vehicle	7			1	1	1	4
Intersection 5	NH 130	NH 130 (Pepperell Rd) and Cross Street	5	Collision	Other Motor Vehicle	5			3		1	1
Intersection 6	NH 130	NH 130 (Main St) and Steam Mill Hill Road	5	Collision	Other Motor Vehicle	3						3
				Collision	Fixed Object - Utility Pole	1			1			
					No Code	1						1
Intersection 7	NH 130	NH 130 (Main St) and Bond St/ Meetinghouse Hill Rd	5	Collision	**Bicyclist**	1			1			
				Collision	Other Motor Vehicle	4					2	2

TABLE 7 (continued): Reportable and Locatable Vehicle Crashes between 2002 and 2009

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 1	NH 13	From Milford Town Line To Old Milford Road	22	Collision	Other Motor Vehicle	8			4		2	2
				Collision	Animal	5						5
				Collision	Fixed Object - Embankment/Ditch/Curb	1						1
				Collision	Fixed Object - Tree	2						2
				Collision	Other Object	1			1			
				Non-Collision	Overturn	2						2
				Non-Collision	Spill (2 Wheel Vehicle)	1			1			
				Non-Collision	Other	2						2

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 2	NH 13	From Old Milford Road To Milford Street	43	Collision	Other Motor Vehicle	16		1	3			12
				Collision	Animal	16						16
				Collision	Fixed Object - Guard Rail	1	1					
				Collision	Fixed Object - Utility Pole	5				1	1	3
				Collision	Fixed Object - Tree	2						2
				Non-Collision	Overturn	1						1
				Non-Collision	Other	2			1			1

TABLE 7 (continued): Reportable and Locatable Vehicle Crashes between 2002 and 2009

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 3	NH 13	From Milford Street To Mason Road/ Meetinghouse Hill Road	9	Collision	Other Motor Vehicle	1						1
				Collision	Animal	2						2
				Collision	Fixed Object - Sign Post	1						1
				Collision	Fixed Object - Tree	3	1		1	1		
				Collision	Other Object	1					1	
				Non-Collision	Spill (2 Wheel Vehicle)	1			1			
Segment 4	NH 13	From Mason Road/ Meetinghouse Hill Road To South Main Street	17	Collision	Other Motor Vehicle	12		2	2		1	7
				Collision	Animal	3						3
				Collision	Thrown or Falling Object	1						1
				Non-Collision	Spill (2 Wheel Vehicle)	1		1				

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 5	NH 13	From South Main Street To State Line	14	Collision	Other Motor Vehicle	3					1	2
				Collision	Animal	4						4
				Collision	Fixed Object - Embankment/Ditch/Curb	1		1				
				Collision	Fixed Object - Sign Post	1			1			
				Collision	Fixed Object - Tree	3			2		1	
				Non-Collision	Spill (2 Wheel Vehicle)	1			1			
				Non-Collision	Submersion	1			1			

Table 7 (continued): Reportable and Locatable Vehicle Crashes between 2002 and 2009

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 6	South Main Street	From NH 130 To NH 13	6	Collision	Other Motor Vehicle	2			1			1
				Collision	Animal	1						1
				Collision	Fixed Object - Guard Rail	1						1
				Collision	Other Object	1						1
				Non-Collision	Spill (2 Wheel Vehicle)	1			1			
Segment 7	Pepperell Road	From Hollis Town Line To NH 130	2	Collision	Other Motor Vehicle	1						1
				Non-Collision	Other	1					1	
Segment 8	NH 130 (Proctor Hill Rd)	From Hollis Town Line To Pepperell Road	4	Collision	Other Motor Vehicle	1						1
				Collision	Animal	1						1
				Collision	Fixed Object - Guard Rail	2						2

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 9	NH 130 (Pepperell Rd/ Main St)	From Pepperell Road/Proctor Hill Road To Old Milford Road	17	Collision	Other Motor Vehicle	7					1	6
				Collision	Animal	2						2
				Collision	Fixed Object - Tree	2			1		1	
				Collision	Other Object	1					1	
				Collision	Thrown or Falling Object	1						1
				Non-Collision	Overturn	1						1
				Non-Collision	Spill (2 Wheel Vehicle)	1			1			
				Non-Collision	Other	2			1			1
Segment 10	NH 130 (Milford St)	From Main Street To NH 13	8	Collision	Other Motor Vehicle	4		1			1	2
				Collision	Animal	1						1
				Collision	Fixed Object - Utility Pole	3					1	2

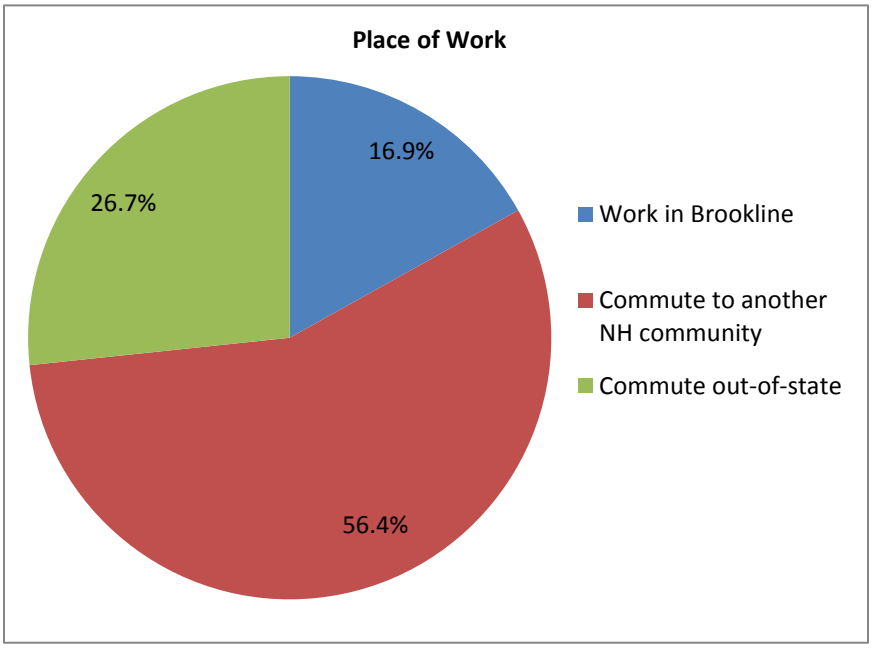
TABLE 7 (continued): Reportable and Locatable Vehicle Crashes between 2002 and 2009

Location ID	Road	Location	Location Total	Accident Type			Accident Severity					
				Type	Description	Type Total	Fatality	Incapacitating	Non-Incapacitating	Possible	Unknown	No Apparent Injury
Segment 11	Old Milford Road	From Main Street To Kodiak Road/ Nightingale Road *location of 2010 fatal accident	23	Collision	Other Motor Vehicle	5			1		1	3
				Collision	Animal	1						1
				Collision	Fixed Object - Embankment/Ditch/Curb	1						1
				Collision	Fixed Object - Utility Pole	5			2		1	2
				Collision	Fixed Object - Tree	5			2		1	2
				Collision	Other Object	1						1
				Non-Collision	Other	4						4
					No Code	1			1			
Segment 12	Old Milford Road	From Kodiak Road To NH 13	5	Collision	Other Motor Vehicle	2					1	1
				Collision	Animal	1						1
				Collision	Fixed Object - Tree	1					1	
				Non-Collision	Overturn	1						1

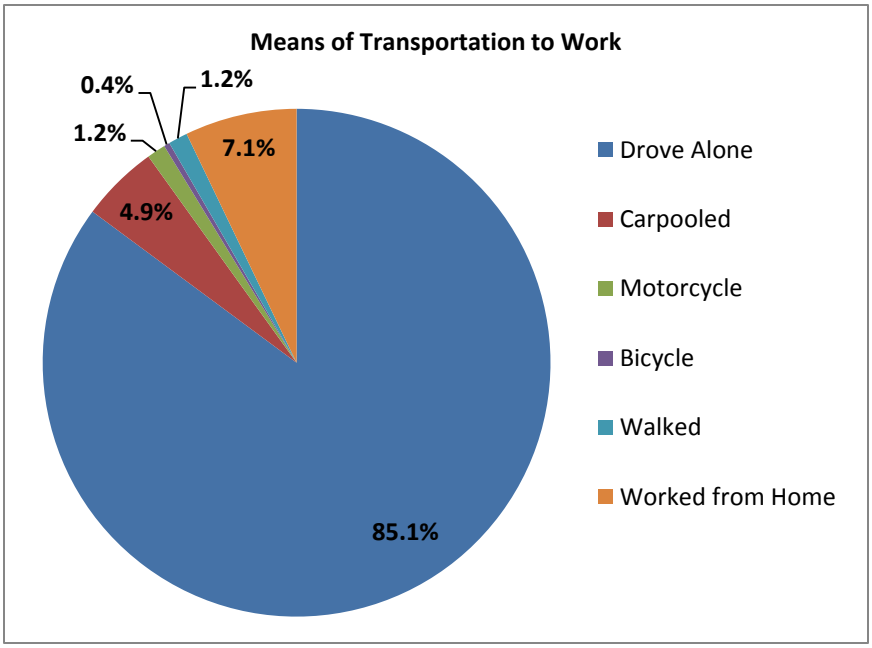
3.6 ~ Commuting

The US Census Bureau's American Community Survey (ACS) is an ongoing survey that provides data every year in the form of 1-, 3- and 5-year period estimates representing the population and housing characteristics over a specific data collection period. The ACS differs from the decennial Census in that the Census shows the *number* of people who live in an area by surveying the total population every 10 years. The ACS shows *how* people live by surveying a sample of the population every year. ACS collects and releases data by the calendar year for geographic areas that meet specific population thresholds; for areas with populations under 20,000, such as Brookline, 5-year estimates are generated. The most recent release represents data collected between January 1, 2006 and December 31, 2010.

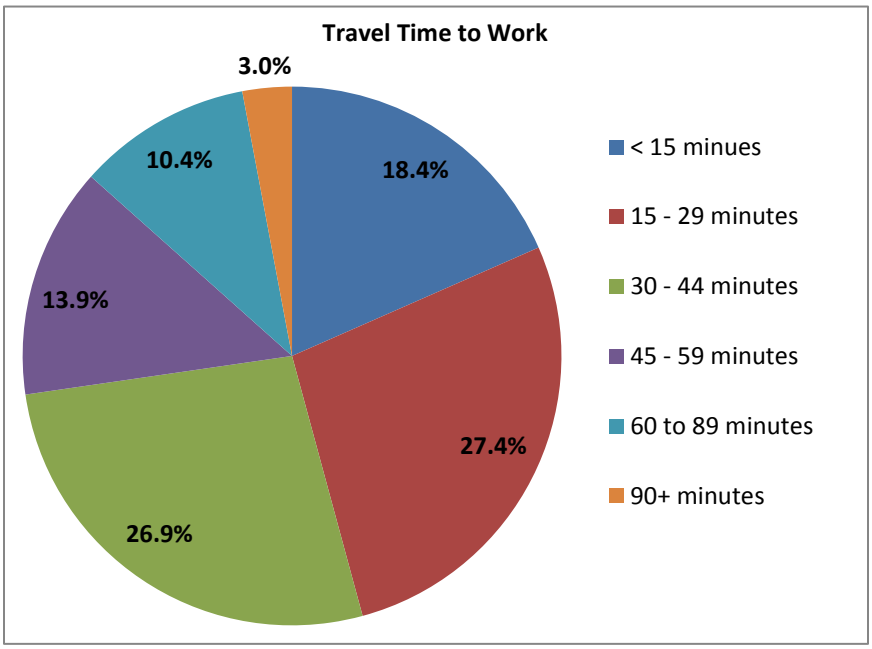
Journey to Work data gathered through the ACS. Commuting data from the 2006-2010 5-year estimates for Brookline was reviewed and is displayed graphically in the charts below. In general, the majority of the working population residing in Brookline works outside of the community but within New Hampshire, drives to work alone, and commutes an average of about 32 minutes to work. It should be noted that the categories "public transportation," "taxi," and "other" are options under "Means of Transportation to Work," however, there were zero respondents who chose those options.



Source: U.S. Census Bureau, 2006 – 2010 American Community Survey



Source: U.S. Census Bureau, 2006 – 2010 American Community Survey



Source: U.S. Census Bureau, 2006 – 2010 American Community Survey

SECTION 4 — ALTERNATIVE TRANSPORTATION

4.1 ~ Public Transportation

There is currently one public transportation provider that services Brookline. Souhegan Valley Transportation Collaborative (SVTC) is a demand response service available to residents of Brookline, Amherst, Hollis, and Milford. Rides must be reserved a minimum of 48 hours in advance. Transportation is provided to and from non-emergency medical appointments as well and to 4 shopping areas: Market Basket in Milford, Shaws/Lorden Plaza in Milford, Stop and Shop/Richmond Plaza in Milford, and Walmart in Amherst.

4.2 ~ Distance to Transportation Options

Table 8 below shows the approximate distance from Brookline to modes of transportation other than a personal vehicle.

TABLE 8: Distance from Brookline to Transportation Options

Mode	Location	Approximate Distance	Approximate Time
Bus	FE Everett Turnpike – Exit 8 Park 'n Ride Nashua, NH	13 miles	25 minutes
Bus	US Route 3 – Exit 35 Park 'n Ride Tyngsborough, MA	19 miles	25 minutes
Commuter Rail	Fitchburg Station Fitchburg, MA	13 miles	25 minutes
Commuter Rail	North Leominster Station North Leominster, MA	16 miles	30 minutes
Commuter Rail	Ayer Station Ayer, MA	16 miles	30 minutes
Commuter Rail	Lowell Station Lowell, MA	28 miles	40 minutes
Airplane	Boire Field Nashua, NH	11 miles	22 minutes
Airplane	Manchester-Boston Regional Airport Manchester, NH	26 miles	40 minutes
Airplane	Logan International Airport Boston, MA	57 miles	70 minutes

Source: Google Maps, 2011

4.3 ~ Bicycle and Pedestrian Facilities

Brookline residents have made it clear through public input sessions and surveys that bicycle and pedestrian facilities are very important. As stated in Section 2 – Transportation Vision, when asked what transportation options residents would like to see maintained or improved, non-motorized options, such as pedestrian and bicycle amenities, ranked well above motorized options, such as rail and public bus

service. Maintaining and improving pedestrian and bicycle facilities throughout the Town, especially near the schools and recreation facilities, is very important to residents. Brookline's taxpayers have appropriated over $250,000 for the construction of sidewalks, primarily within the Town Center. The Town's philosophy has historically been to "build a modest portion of sidewalk each year that will add up over time."[2] There are currently about 13,500 linear feet of sidewalk in Brookline.

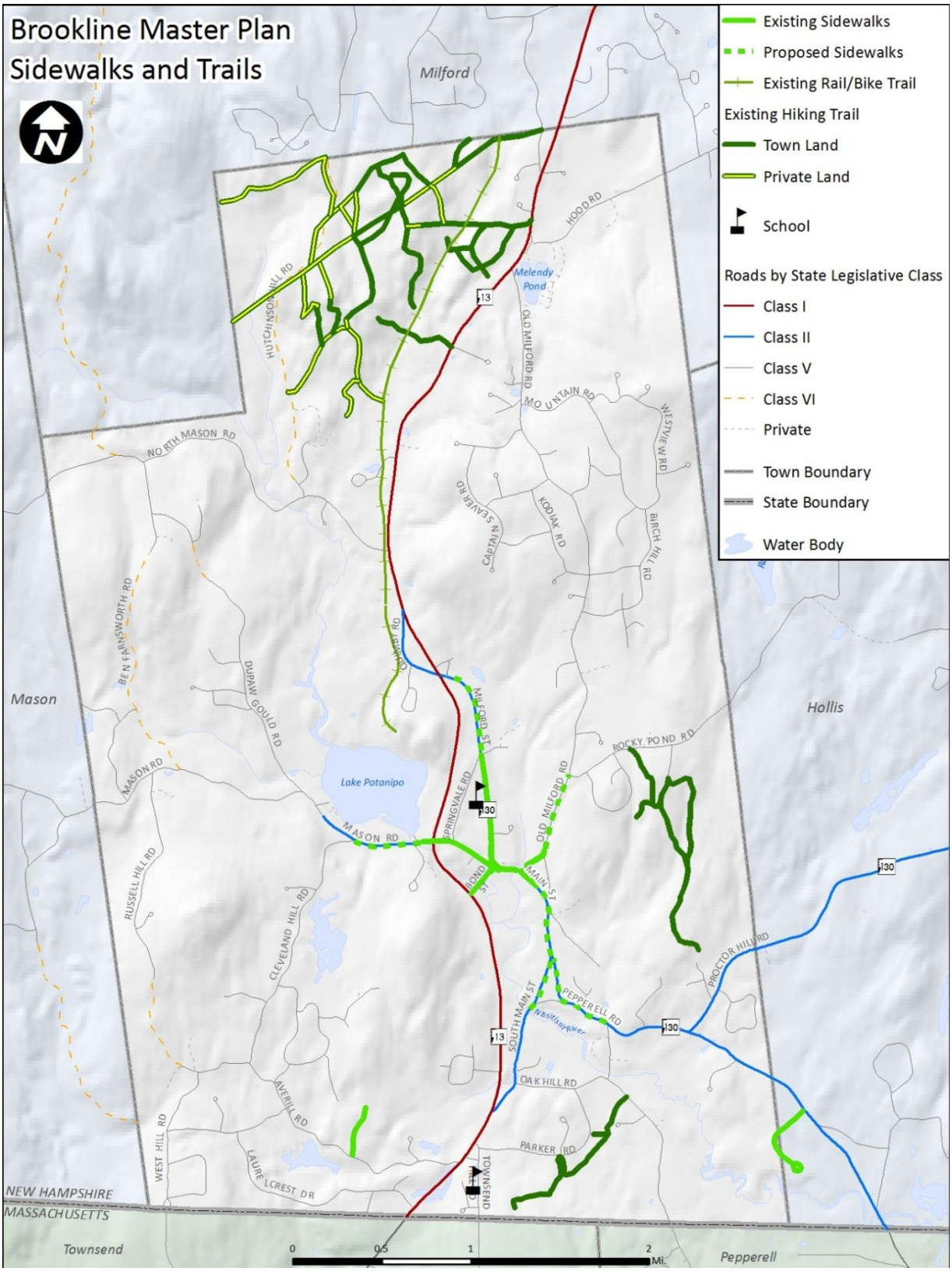
In 2008, the Town successfully applied for federal funds through the Safe Routes to Schools (SRTS) program, which strives to increase the number of K-8th grade children who walk or bike to school. The funds were used in 2010 to construct 1,280 feet of sidewalk in front of the Richard Maghakian Memorial School (RMMS), to purchase two vehicle speed feedback signs, and to develop a bicycle safety program. The SRTS funds were also used to construct 200 feet of sidewalk in front of Captain Samuel Douglass Academy (CSDA), to purchase one portable "yield to pedestrians in crosswalk" sign, and to develop and support the same bicycle safety program as at RMMS.

The development of a Sidewalk and Trail Connection Plan in August 2009 further documents the Town's commitment to improved amenities that will support a walkable Town Center, encourage non-motorized travel, and provide healthy ways for the residents and visitors to enjoy the community's facilities and natural landscapes. The plan proposes to construct an additional 13,700 linear feet of sidewalk that will provide for safe pedestrian travel along the full length of the Town Center, from the Post Office to Brookline Chapel and Brush Hall; extend the sidewalk network toward the high-density neighborhoods of Old Milford Road, Oak Hill Road, and Cleveland Hill Road; and allow pedestrian access to hiking trails and the rail trail. Figure 10 displays the existing and proposed sidewalk and trail network in Brookline.

Please see Section 6—Transportation Improvement Funding Sources for information on potential funding sources for alternative transportation modes.

[2] Town of Brookline Sidewalk and Trail Connection Plan (Adopted by Selectmen August 2009) pg. 1

FIGURE 10: Sidewalks and Trails



Source: Brookline Sidewalk and Trail Connection Plan, 2010

SECTION 5 — TRANSPORTATION TECHNIQUES

5.1 ~ Traffic Calming

Traffic calming techniques are designed to reduce vehicle speeds, increase space for pedestrians and bicyclists on the roadway, create sense of community, and improve the local environment. This is accomplished by creating physical structures and visual cues that induce drivers to slow down. Communities that implement traffic calming measures also see a reduction in both the number and severity vehicular accidents. As more vehicles take to the road in this region, traffic calming techniques also play an important role in enhancing the livability of communities. When properly implemented, these measures decrease noise and air pollution, and allow pedestrians and bicyclists to more safely and comfortably take to the streets. Traffic calming techniques can be customized to fit the needs of any community.

5.2 ~ Access Management

Access management involves providing (or managing) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed. It is the practice of coordinating the location, number, spacing, and design of access points to minimize site access conflicts and maximize the traffic capacity of a roadway. Current planning efforts focus on all modes of transportation including vehicles, public transit, bicycles, and pedestrians.

5.3 ~ Corridor Design Guidelines

The goal of corridor design guidelines can be to preserve the small town character of a community by encouraging coordinated traffic patterns and context-appropriate appearance of development along a community's main corridors. Promoting the traditional pattern of growth within a community creates pedestrian friendly and distinctive places for dining, shopping, working, and living.

5.4 ~ Scenic Roads

As New Hampshire's residential, commercial and industrial development has grown, so has the need to improve the road system, thereby reducing the number of country roads that constitute an important asset to the State. To prevent the elimination of scenic roads, communities are enabled by State legislation to designate roads other than state highways as Scenic Roads. This Law protects such roads from repair or maintenance that would involve the cutting or removal of medium and large-sized trees, except with the written consent of an official body. The law is an important tool in protecting the scenic qualities of roads. The large trees and stone walls that line many rural roads are irreplaceable and contribute heavily to the New England character of the region's towns. In Brookline, North Mason and Averill Roads have been designated as Scenic Roads.

SECTION 6—TRANSPORTATION IMPROVEMENT FUNDING SOURCES

The following sections provide information on the types of transportation projects that are eligible for federal and/or state funding:

6.1 ~ Federal Funding

Roadway/Bridge Projects

Roadways that are designated as being part of the National Highway System (NHS) or roadways that are located on a Federal-aid Highway are eligible for federal funds. Roads functionally classified as local streets or rural minor collectors are not part of the Federal-aid Highway System and are not generally eligible for Surface Transportation Program (STP) or NHS funds.

Federal funds may be used for construction, reconstruction, rehabilitation, resurfacing, restoration, and operational improvements for highways and bridges (including bridges on public roads of all functional classifications), including any such construction or reconstruction necessary to accommodate other transportation modes; intersection improvements such as reconfiguration, lane additions, and signalization; safety improvements including traffic calming, signage, and barriers; and carpool, parking, bicycle, and pedestrian facilities.

In addition to federal funding, there are state funding programs available for roadway and bridge projects. Brief descriptions of those programs are provided under “Other Funding Programs”.

Public Transportation Projects

The Federal Transit Administration (FTA) provides four categories of funding for projects within the Nashua Metropolitan area.

1. Urbanized Area Formula Funding (5307)—available to urbanized areas and to Governors for transit capital and operating assistance in urbanized areas (population greater than 50,000) and for transportation related planning. Eligible activities include planning, engineering design, and evaluation of transit projects and other technical transportation-related studies; capital investments in bus and bus-related activities such as replacement of buses, overhaul of buses, rebuilding of buses, crime prevention and security equipment, and construction of maintenance and passenger facilities; and capital investments in new and existing fixed guideway systems including rolling stock, overhaul and rebuilding of vehicles, track, signals, communications, and computer hardware and software. All preventive maintenance and some Americans with Disabilities Act complementary paratransit service costs are considered capital costs.

2. Transportation for Elderly Person and Persons with Disabilities (5310)—funding to assist private nonprofit groups in meeting the transportation needs of the elderly and persons with disabilities when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs. Capital expenses that support transportation to meet the special needs of older adults and persons with disabilities are eligible.

3. Job Access and Reverse Commute Program (5316)—the Job Access and Reverse Commute (JARC) program was established to address the unique transportation challenges faced by welfare recipients and low-income persons seeking to obtain and maintain employment. Capital, planning, and operating expenses are eligible for projects that transport low income individuals to and from jobs and activities related to employment, and for reverse commute projects.

4. New Freedom Program (5317)—the New Freedom formula grant program seeks to reduce barriers to transportation services and expand the transportation mobility options available to people with disabilities beyond the requirements of the Americans with Disabilities Act (ADA) of 1990. Capital and operating expenses for new public transportation services and new public transportation alternatives beyond those required by the ADA that are designed to assist individuals with disabilities are eligible.

Transportation Demand Management Projects

Transportation Demand Management (TDM) is a general term that describes the use of one or more strategies to encourage more efficient use of transportation systems, primarily by shifting single-occupant vehicle (SOV) trips to non-SOV modes, or shifting auto trips out of peak periods. Eligible projects include development of employer-based transportation management plans, provisions to encourage ridesharing (carpool/vanpool), fringe and corridor parking facilities and programs, provisions for bicycle transportation and pedestrian walkways, and infrastructure-based intelligent transportation systems capital improvements.

Bicycle/Pedestrian Projects

Surface Transportation Funds (STP) may be used for the construction of pedestrian walkways and bicycle transportation facilities and for carrying out non-construction projects related to safe bicycle use. In addition, construction of pedestrian walkways and bicycle transportation facilities on land adjacent to any highway on the National Highway System are eligible for NHS funds.

The Transportation Enhancement and Safe Routes to School programs also fund bicycle and pedestrian projects and are described below.

Transportation Enhancements

Transportation Enhancements (TE) activities are federally-funded community-based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic, and environmental aspects of transportation infrastructure. Approximately $3.2 million per year has been available to fund TE projects; 80% of the project cost is eligible for TE funding and 20% must be provided by the project sponsor. Projects being funded through the TE program must relate to surface transportation and fall under one of the following 12 eligible activities:

a) Provision of facilities for bicyclists and pedestrians
b) Provision of safety and educational activities for bicyclists and pedestrians
c) Acquisition of scenic easements and scenic or historic sites

d) Scenic or historic highway programs (including the provision of tourist and welcome center facilities)
e) Landscaping and other scenic beautification
f) Historic preservation
g) Rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities and canals)
h) Preservation of abandoned railway corridors (including the conversion for use as bicycle paths and pedestrian facilities)
i) Control and removal of outdoor advertising
j) Archaeological planning and research
k) Environmental mitigation to address water pollution due to highway runoff or reduce vehicle-caused wildlife mortality while maintaining habitat connectivity
l) Establishment of transportation museums

The application process for TE funds is directed by the NH DOT on a two-year cycle with the Regional Planning Commissions (RPCs) playing an integral role in application development and regional project scoring and prioritization. Projects are also scored and prioritized at the state level by NH DOT and by the TE Advisory Committee, which makes final project recommendations to the Commissioner.

Congestion Mitigation and Air Quality

The purpose of the Congestion Mitigation and Air Quality (CMAQ) program is to fund transportation projects or programs that will contribute to attainment or maintenance of the national ambient air quality standards (NAAQS) for ozone, carbon monoxide (CO), and particulate matter (PM). The CMAQ program, funded with approximately $8 million per year, supports two important transportation goals: improving air quality and relieving congestion. As with the TE program, a 20% local match is required. There are sixteen eligible program categories for CMAQ projects:

a) Traffic Control Measures (TCM)
b) Extreme Low-Temperature Cold Start Programs
c) Alternative Fuels & Vehicles
d) Congestion Reduction & Traffic Flow Improvements
e) Transit Improvements
f) Bicycle & Pedestrian Facilities & Improvements
g) Travel Demand Management
h) Public Education & Outreach Activities
i) Transportation Management Associations
j) Carpooling & Vanpooling Programs
k) Freight/Intermodal
l) Diesel Engine Retrofits & Other Advanced Technologies
m) Idle Reduction
n) Training
o) Inspection/Maintenance Programs
p) Experimental Pilot Projects

The application process for CMAQ funds is directed by the NH DOT on a two-year cycle with the Metropolitan Planning Organizations playing an integral role in application development, including conducting required air quality analyses, and regional project scoring and selection. Projects are scored

and prioritized at the state level by NH DOT and by the CMAQ Advisory Committee, which makes final project recommendations to the Commissioner.

Safe Routes to School

The Safe Routes to School Program (SRTS) encourages students from kindergarten through 8th grade to safely walk or bike to school by using a variety of education methods and incentives. The program also addresses parents' safety concerns by encouraging greater enforcement of traffic laws; exploring ways to create safer streets; and educating the public about safe biking, walking, and driving practices. The overall goals of the Safe Routes to School Program are to reduce traffic near schools, enhance air quality, and improve children's health through increased physical activity.

The Safe Routes to School program, which receives $1 million per year for five years, funds non-infrastructure projects, such as parent and student surveys, pedestrian and bicycling safety education, incentive programs, and motorist education and enforcement. The program also funds infrastructure projects such as new sidewalk construction, development of bike routes and bike paths, and installation of signs and signals. It is a competitive grant program administered by the NH DOT with the RPCs facilitating the application process. Projects are scored and prioritized at both the regional level by the RPC and at the state level by the SRTS Advisory Committee. One-hundred percent of a project's cost is eligible for SRTS funding.

Highway Safety Improvement Program

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program established to achieve a significant reduction in traffic fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements. HSIP funds may be used to carry out highway safety improvement projects on any public road or publicly owned bicycle or pedestrian pathway or trail. Locations for improvements are identified through crash data that demonstrates there is a safety problem.

As part of the HSIP, the Railway-Highway Crossings Program funds projects that eliminate hazards and install protective devices at public railway-highway crossings. In addition, a High Risk Rural Road Program was established to provide funding for construction and operational improvements on rural major or minor collectors or rural local roads.

The application process for HSIP projects includes a Road Safety Audit (performed by an independent audit team) recommending specific improvements and/or a Benefit Cost Analysis greater than 2.5 and a cost less than 100k. Applications for the Road Safety Audit are provided by NH DOT and require the support of the RPC, NH DOT District, and municipality. New Hampshire receives $6 million per year for HSIP projects, which require a 10% local match.

Scenic Byways

The National Scenic Byways Program is a voluntary, community-based program administered through the Federal Highway Administration to recognize, protect, and promote America's most

outstanding roads. The National Scenic Byways Discretionary Grants program provides funding for byway-related projects each year. Funds may be used to undertake eligible projects along All-American Roads, National Scenic Byways, State Scenic Byways, and Indian Tribe Scenic Byways, as well as for the planning, design, and development of State scenic byways programs. New Hampshire receives $500,000 per year for its Scenic Byway program and projects selected for funding require a 20% local match.

Emergency Relief

Federal funds are available for federal-aid eligible municipal roads requiring emergency repairs. For projects requiring immediate repairs, 100% of the cost is eligible for funding through the Emergency Relief program; other repairs require a 20% match.

6.2 ~ State Funding Programs

State Aid Funds

State Aid Funds are provided for the purpose of constructing or reconstructing sections of Class I, II, and III (state-owned) highways. This work, when requested by a municipality, would include improvements to unimproved sections of State secondary, Class II highways and Class III highways or to advance the priority of construction for special types of work such as improving drainage, riding surface, or elimination of sharp curves on Class I highways or improved sections of Class II highways. Project costs are capped at $1,050,000 and require a local match of one-third of the total cost. Unnumbered state routes that are reconstructed through this program are reclassified as Class V (town roads) upon project completion. As of Fiscal Year (FY) 2011, NH DOT is programming new projects for this program starting in FYs 2014-2015.

Bridge Aid Funds

Bridge Aid Funds consist of both State and Federal Highway Funds budgeted for construction or reconstruction of structures on Class IV and Class V highways as well as municipally-maintained bridges on Class II highways. Structures having a clear span of ten (10) feet or greater qualify for State Bridge Aid funds; Federal Bridge Aid Funds typically fund larger bridge projects. Both fund sources require a 20% local match. A total of about $13 million per year (which includes local match) has been available for funding municipal bridge projects through both funding sources. As of FY2011, NH DOT is programming new projects starting in FYs 2019-2020.

Highway Block Grant Aid

By law, all municipalities in the State having Class IV and V mileage are entitled to Highway Block Grant Aid. RSA 235:23 stipulates the funding apportionments. Highway Block Grant Aid is distributed to municipalities by the State of New Hampshire on a yearly basis with partial disbursements made four times a year. Sixty percent (60%) of the funds are distributed in the first two payments (30% in July and October) and the other 40% in the final two payments (20% in January and April). The funds can only be used for construction, reconstruction, and maintenance of each municipality's Class IV and V highways.

It can, therefore, be used to be part of the match for a project in the bridge aid program. It also can be used towards equipment to maintain the local roads.

Highway Block Grant Aid funds represent a portion of the State's highway revenues received in the preceding fiscal year. There are two "pots" of money from which allotments are made. The first, identified as Apportionment A, represents 12% of the State's highway revenues. One-half of that "pot" is distributed among the municipalities based on their population in proportion to the entire State's population. The other half is disbursed based on a municipality's Class IV and V road mileage in proportion to the total statewide Class IV and V mileage. In general, the allocation of these funds represents a disbursement of approximately $1,200 for each mile of Class IV and Class V highway inventoried by each municipality and $11 for each person residing in a municipality based on the state planning estimate of population.

The formula for dispensing funds from the second "pot" of money (a set sum of $400,000) is less straightforward. It was established to assist those municipalities that have high roadway mileage to maintain and very low property value (on an equalized basis) in relationship to other communities.

As the New Hampshire Department of Transportation (NH DOT) is responsible for determining the actual disbursements of funds**, it is important that they be provided accurate and current information regarding each municipality's Class IV and V mileage.** This is typically accomplished by filling out the "Information Report" sent to municipalities each year by the Bureau of Planning and Community Assistance. At the conclusion of each municipality's yearly legislative meeting (i.e. Town Meeting), the NH DOT should be notified of all changes to the community's roadway system. The information should include the length and location of all Class IV and V highways reclassified, accepted, and/or discontinued by the municipality that year.

For more information contact the NH DOT Bureau of Planning and Community Assistance:
http://www.nh.gov/dot/org/projectdevelopment/planning/documents/BGAfundDescription.pdf

SECTION 7—RECOMMENDATIONS

New Hampshire RSA 228:99 and RSA 240 require the New Hampshire Department of Transportation propose a plan for improvements to the State's transportation system. The State's Ten Year Plan identifies and prioritizes the critical transportation needs in New Hampshire and drives the State's transportation planning process. There are currently no projects in Brookline included in the State's 2011 – 2020 Ten Year Plan.

The Nashua Region Metropolitan Transportation Plan (MTP), formerly referred to as the Long Range Transportation Plan, is the foundation for identifying and implementing transportation needs and improvements in the region. It serves as both the policy document for transportation planning in the region and the source from which specific transportation projects are identified, prioritized, and selected for funding. The requirements for developing the MTP are currently defined by federal regulations. One project has been proposed by the Town for inclusion in the Nashua Region MTP—a southbound left turn lane at the intersection of NH 13 and Old Milford Road. Nashua Regional Planning

Commission (NRPC) has identified this intersection as a safety concern in both the NH 13 Access Management Study and the Vision Plan for NH 13 and NH 130.

The Nashua Metropolitan Area Transportation Improvement Program (TIP) serves as the short-term (four-year) capital investment plan for transportation improvements in the Nashua region. The TIP is essentially the short-range transportation improvement component of the MTP, and is updated and readopted every two years (in even numbered years) by the Commission. The TIP lists those financially-constrained projects that are proposed for implementation. The first two years of the TIP contain projects that have been selected for funding through a cooperative process with the NH DOT. In the normal course of events, as the first two years are implemented, the financially constrained projects that are listed in the third year become first year projects during the next two-year update cycle.

No project using Federal transportation funds may be implemented in the Nashua Metropolitan Planning Organization region (which includes Brookline) unless it is part of an approved, conforming TIP. The requirements of TIP development are provided in 23 CFR Part 450 Subpart C §450.324-330 of the Metropolitan Transportation Planning and Programming rules. There are currently no projects in Brookline included in the NRPC TIP.

Recommendations developed through various transportation plans and studies in Brookline and from public input sessions are summarized in Tables 9 and 10 below.

TABLE 9: General Recommendations

General Recommendations	Time Frame
Create a Traffic and Safety Committee to: • Identify and implement methods for improving safety for vehicles, pedestrians, and bicycles such as improved traffic calming, pavement markings, and speed enforcement strategies. • Assist in the review of proposals for new road construction and/or access points on major routes to assess the potential impacts of new construction on traffic volumes and safety. Include input of emergency management personnel, especially when considering construction of dead end roads.	1 – 3 Years
Develop Road and Bridge Maintenance Plans to guide the selection and prioritization of infrastructure improvements and maintenance activities, including road widening, improvements to horizontal and vertical alignments (grading and curves), drainage system improvements, and paving/resurfacing.	1 – 3 Years
Upgrade crosswalks with crosswalk signs and bright pavement markings, and where possible, crossing signals and raised pavement.	1 – 3 Years
Work with utility company to install more efficient street lights and add shields.	1 – 3 Years
Explore the feasibility of establishing a transit feeder route to Milford and/or Nashua to serve residents and workers.	1 – 3 Years
Consider building new and/or improving existing road corridors to enhance accessibility and connectivity: • Improve Hood Road from NH 13 in Brookline to Milford to allow a connection to NH 101A and NH 122 via Foster Road and Ponemah Hill Road in Milford, and Federal Hill Road in Hollis*. (Scheduled to be improved beginning in 2013 per the Brookline 2010-2015 Capital Improvements Plan).* • Extend Cross Road over the Nissitissit River to NH 13 • Potential new roads/connections: o From Old Milford Road to Milford Street (NH 130); alternatively, continue Bear Hill Road to NH 13 o From Captain Seaver Road to NH 13 o From Lorden Lane to High View Drive o From Ben Farnsworth Road to Dupaw Gould Road	2+ Years

General Recommendations	Time Frame

Implement improvements near Richard Maghakian Memorial School (RMMS) as recommended in Route 130 Corridor Study:
• Remove the passing zone just north of the elementary school
• Eliminate/reduce the line of traffic in front of school
• Clearly indicate on NH 130 that a school zone is being entered:
  ○ Use pavement markings and traffic calming techniques such as textured pavements and speed tables
  ○ Use signage, landscaping/streetscaping, lighting, and other indicators
• Raise crosswalk and mark with highly visible paint; install a pedestrian-actuated stop signal and planted bump-outs.
• Enlist the help of the Brookline Police Department to aggressively enforce traffic and parking laws (including warnings and citations) during the first two weeks of school each fall and develop a strategy for enforcement during the rest of the year
	3 – 5 Years

Reconstruct/rehabilitate Bond Street Bridge over Nissitissit River (Bridge ID 088/074)	8 – 10 Years (if with State/Federal Aid)
Explore feasibility of relocating NH 130 • Redesignate Cross Street and part of South Main Street as NH 130 and construct new connection to NH 13 south of Nissitissit River Bridge • Redesignate part of Pepperell Road, Main Street, and Milford Street as local roads	10+ Years
Construct new sidewalks as recommended in the Sidewalk and Trail Connection Plan: • Segment A: Milford Street from Austin Road northerly to Post Office/Safety Complex • Segment B: Main Street from Elm Street southerly to Brush Hall • Segment C: Mason Road from the Lake Potanipo Boat Launch westerly to Cleveland Hill Road • Segment D: South Main Street from NH 130/Main Street southerly to the bridge over the Nissitissit River • Segment E: Old Milford Road from Steam Mill Hill Road northerly to Rocky Pond Road • Segment F: Pepperell Road from South Main Street southerly to Bohannon Bridge Road	Funding for Segments A and B through the 2009-2010 Transportation Enhancement program Remaining segments to be built as spending is approved by tax payers and/or as additional grant money received.

TABLE 10: Specific Recommendations

Specific Recommendations	Time Frame

Coordinate with NH DOT to include intersection improvements as part of state pavement maintenance and rehabilitation activities on Class I and Class II roads. Specific improvements include:
• NH 13 at South Main Street :
  ○ Reconfigure South Main Street alignment to 90° and reconfigure commercial business driveway to form one access/egress point aligned directly across from South Main Street
  ○ Add center turn lanes from NH 13 onto South Main Street
• NH 13 and Old Milford Road
  ○ Add a southbound left turning lane on Route 13 at Old Milford Road
  (*To be included in NRPC MTP for advancement into State's Ten Year Plan when funding becomes available).*
• NH 13 and Meetinghouse Hill /Mason Road
  ○ Add left turn lane from NH 13 onto Mason Road
  ○ Add right turn lane from Meetinghouse Hill Road onto NH 13
  ○ Improve pedestrian access to Lake Potanipo from Meetinghouse Hill Road (e.g., brightly marked crosswalk with crossing signs and/or signals)
• NH 130 and Cross Street: Assess feasibility of intersection improvements
	Ongoing; dependent on NH DOT maintenance and improvement plans
	
	Consider applying for Highway Safety Improvement Program (HSIP) Funding through NH DOT (Division of Project Development, Bureau of Highway Design)

For new development along primary corridors (NH 13, NH 130), the safest possible access points should be selected and meet standard design guidelines. Access points on either side of the corridor should be aligned to form four-way intersections. Buffering in front of lots should be encouraged to maintain rural characteristics.	Ongoing
Encourage land use patterns that will facilitate a variety of transportation modes for residents of all ages, especially walking and bicycling.	Ongoing
Assess feasibility of providing paved shoulders suitable for safe bicycle and pedestrian use on all roads as part of planning process when developing roadway improvement and maintenance strategies. Construct where feasible. The preferred facility for bicycle travel is a four-foot paved shoulder separated from motorized travel lanes by a six to eight inch painted white stripe. Where paved shoulders and bicycle lanes are not possible, shared roadways with appropriate signage and safety improvements are recommended.	Ongoing

SECTION 8—REFERENCES: FHWA FUNCTIONAL CLASSIFICATION GUIDELINES

Source: http://www.fhwa.dot.gov/planning/fcsec2_1.htm#tcofc

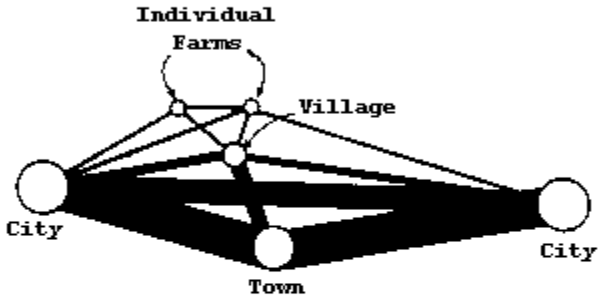
8.1 ~ The Concept of Functional Classification

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. Basic to this process is the recognition that individual roads and streets do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads. It becomes necessary then to determine how this travel can be channelized within the network in a logical and efficient manner. Functional classification defines the nature of this channelization process by defining the part that any particular road or street should play in serving the flow of trips through a highway network.

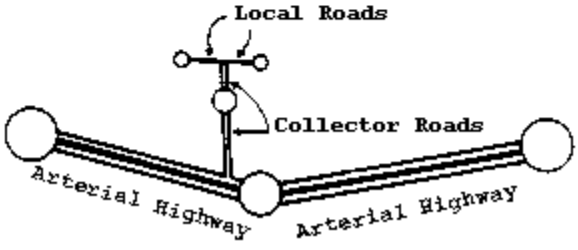
A schematic illustration of this basic idea is provided in Figure II-1. In the upper diagram, lines of travel desire are shown as straight lines connecting trip origins and destinations. Relative widths of lines indicate relative amounts of travel desire.

Figure II-1

Channelization of Trips



(A) Desire Lines of Travel



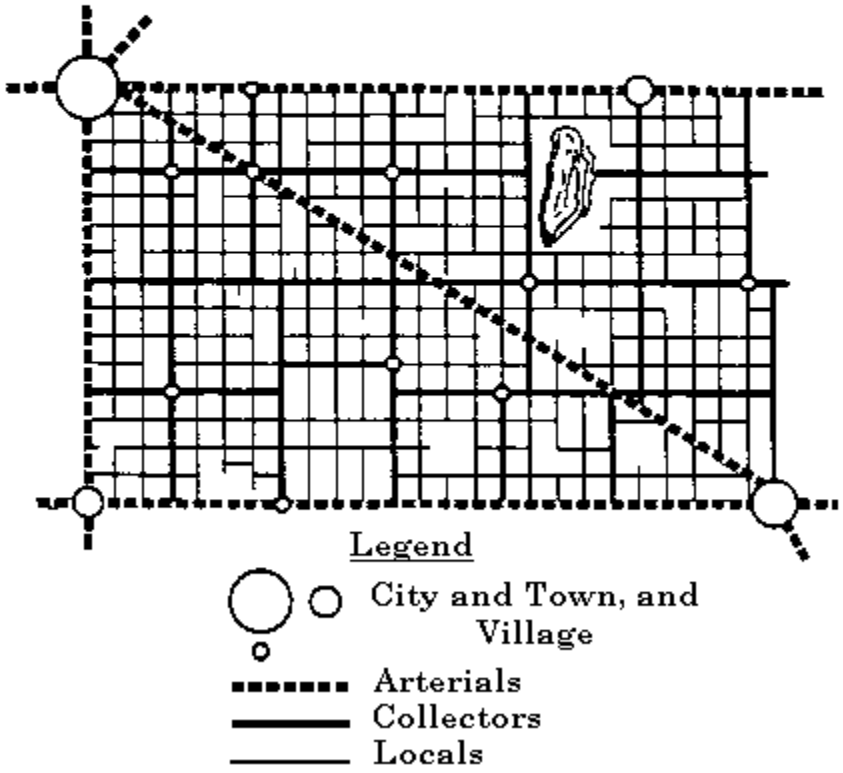
(B) Road Network provided

Relative sizes of circles indicate relative trip generating or attracting power of the places shown. Since it is impractical to provide direct-line connections for every desire line, trips must be channelized on a limited road network in a logical and efficient manner. This can be done as shown in the lower diagram of Figure II-1. Note that the heavy travel movements are directly served or nearly so, and that the lesser ones are channeled into somewhat indirect paths. The facilities shown in the diagram have been labeled local, collector, and arterial, terms that are descriptive of their functional relationships. Note particularly that this hierarchy of functional types relates directly to the hierarchy of travel distances that they serve.

A more complete (though still schematic) illustration of a functionally classified rural network is shown in Figure II-2. Since the cities and larger towns generate and attract a large proportion of the relatively longer trips, the arterial highways generally provide direct service for such travel. The intermediate functional category, the collectors, serves small towns directly, connects them to the arterial network, and collects traffic from the bottom-level system of local roads, which serves individual farms and other rural land uses.

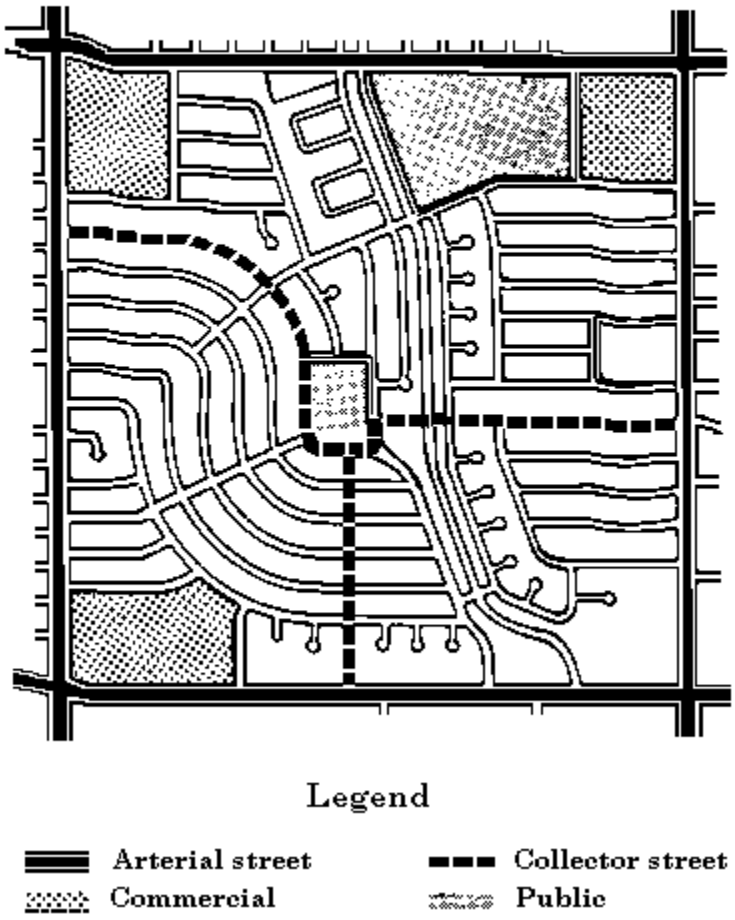
Figure II-2

Schematic Illustration of a Functionally Classified Rural Highway Network



Although the above example has a rural setting, the same basic concepts apply in urban areas as well. However, because of the high intensity of land use and travel throughout an urban area, specific travel generation centers are more difficult to identify. In urban areas additional considerations, such as spacing, become more important in defining a logical and efficient network. A schematic illustration of a functionally classified urban street network is shown in Figure II-3.

Figure II-3
Schematic of a Portion of an Urban Street Network



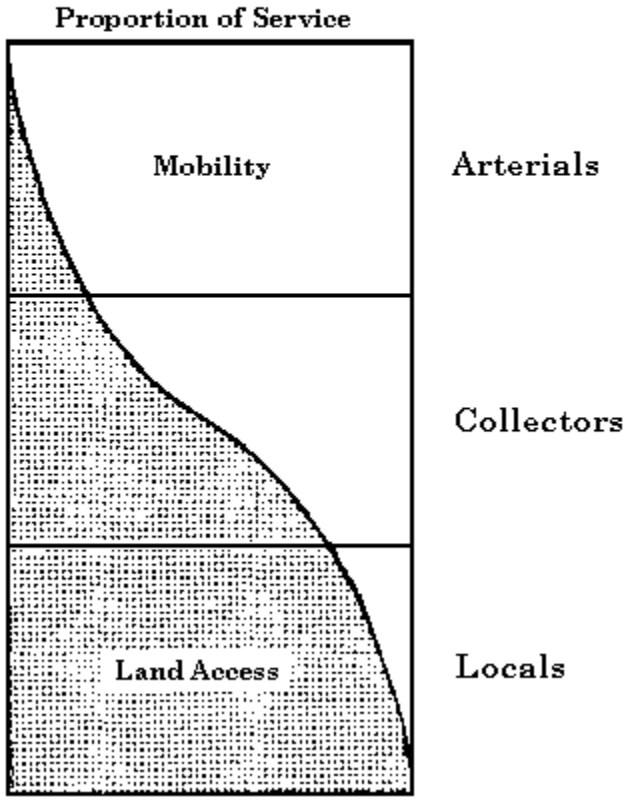
Allied to the idea of traffic channelization is the dual role the highway network plays in providing (1) access to property and (2) travel mobility. Access is a fixed requirement, necessary at both ends of any trip. Mobility, along the path of such trips, can be provided at varying levels, usually referred to as "level of service." It can incorporate a wide range of elements (e.g., riding comfort and freedom from speed changes) but the most basic is operating speed or trip travel time.

It was pointed out in the discussion of Figure II-1 that the concept of traffic channelization leads logically not only to a functional hierarchy of systems, but also to a parallel hierarchy of relative travel distances

served by those systems. This hierarchy of travel distances can be related logically to a desirable functional specialization in meeting the access and mobility requirements. Local facilities emphasize the land access function. Arterials emphasize a high level of mobility for through movement. Collectors offer a compromise between both functions. This is illustrated conceptually in Figure II-4.

Figure II-4

Relationship of functionally Classified Systems in Serving Traffic Mobility and Land Access



Functional classification can be applied in planning highway system development, determining the jurisdictional responsibility for particular systems, and in fiscal planning. These applications of functional classification are discussed in "A Guide for Functional Highway Classification." [1]

8.2 ~ AREA DEFINITIONS

Urban and rural areas have fundamentally different characteristics as to density and types of land use, density of street and highway networks, nature of travel patterns, and the way in which all these elements are related in the definitions of highway function. Consequently, this manual provides for separate classification of urban and rural functional systems.

Experience has shown that extensions of rural arterial and collector routes provide an adequate arterial street network in places of less than 5,000 population. Hence urban classifications as discussed herein are considered in the context of places of 5,000 population or more.

Urban areas are defined in Federal-aid highway law (Section 101 of Title 23, U.S. Code) as follows:

"The term 'urban area' means an urbanized area or, in the case of an urbanized area encompassing more than one State, that part of the urbanized area in each such State, or an urban place as designated by the Bureau of the Census having a population of five thousand or more and not within any urbanized area, within boundaries to be fixed by responsible State and local officials in cooperation with each other, subject to approval by the Secretary. Such boundaries shall, as a minimum, encompass the entire urban place designated by the Bureau of the Census."

For clarity and simplicity this reference manual will use the following terminology, which is consistent with the above definition.

Small urban areas are those urban places, as designated by the Bureau of the Census, having a population of five thousand (5,000) or more and not within any urbanized area.

Urbanized areas are designated as such by the Bureau of the Census.

Rural areas comprise the areas outside the boundaries of small urban and urbanized areas, as defined above.

8.3 ~ FUNCTIONAL SYSTEM CHARACTERISTICS

The following pages are devoted to separate descriptions of the characteristics of the basic functional systems and their subsystems for (1) rural areas, (2) urbanized areas, and (3) small urban areas. The primary functional categories used for each of the three area types are presented in Table II-1.

Table II-1 -- The Hierarchy of Functional Systems

Rural areas	Urbanized areas	Small Urban areas
Principal arterials Minor arterial roads Collector roads Local roads	Principal arterials Minor arterial streets Collector streets Local streets	Principal arterials Minor arterial strets Collector streets Local streets

Since there is a wide variation in the characteristics and magnitude of service provided by each of these basic functional systems, further stratification of routes in these systems is prescribed to insure greater adaptability for subsequent use. In rural areas, routes on the principal arterial system are subclassified as Interstate and other principal arterials, and routes on the collector road system are subclassified as major collector roads and minor collector roads. In urbanized and small urban areas, the routes on the

principal arterial system are subclassified as Interstate, other freeways and expressways, and other principal arterials.

Functional Systems for Rural Areas

Rural roads consist of those facilities that are outside of small urban and urbanized areas, as previously defined. They are classified into four major systems: principal arterials, minor arterial roads, major and minor collector roads, and local roads.

Rural Principal Arterial System

The rural principal arterial system consists of a connected rural network of continuous routes having the following characteristics:

1. Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel.
2. Serve[2] all, or virtually all, urban areas of 50,000 and over population and a large majority of those with population of 25,000 and over.
3. Provide an integrated network without stub connections except where unusual geographic or traffic flow conditions dictate otherwise (e.g., international boundary connections and connections to coastal cities).

In the more densely populated States, this system of highway may not include all heavily traveled routes that are multi-lane facilities. It is likely, however, that in the majority of States the principal arterial system will include all existing rural freeways.

The principal arterial system is stratified into the following two subsystems:

1. *Interstate System*—the Interstate System consists of all presently designated routes of the Interstate System.
2. *Other Principal Arterial*—this system consists of all non-Interstate principal arterials.

Rural Minor Arterial Road System

The rural minor arterial road system should, in conjunction with the principal arterial system, form a rural network having the following characteristics:

1. Link cities and larger towns[3] (and other traffic generators, such as major resort areas, that are capable of attracting travel over similarly long distances) and form an integrated network providing interstate and intercounty service.
2. Be spaced at such intervals, consistent with population density, so that all developed areas of the State are within a reasonable distance of an arterial highway.
3. Provide (because of the two characteristics defined immediately above) service to corridors with trip lengths and travel density greater than those predominantly served by rural collector or local systems. Minor arterials therefore constitute routes whose design should be expected to

provide for relatively high overall travel speeds, with minimum interference to through movement.

Rural Collector Road System

The rural collector routes generally serve travel of primarily intracounty rather than statewide importance and constitute those routes on which (regardless of traffic volume) predominant travel distances are shorter than on arterial routes. Consequently, more moderate speeds may be typical, on the average.

In order to define more clearly the characteristics of rural collectors, this system should be subclassified according to the following criteria:

- *Major collector roads*—these routes should (1) provide service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems, and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, important mining and agricultural areas, etc.; (2) link these places with nearby larger towns or cities, or with routes of higher classification; and (3) serve the more important intracounty travel corridors.
- *Minor collector roads*—these routes should (1) be spaced at intervals, consistent with population density, to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road; (2) provide service to the remaining smaller communities; and (3) link the locally important traffic generators with their rural hinterland.

Rural Local Road System

The rural local road system should have the following characteristics: (1) serve primarily to provide access to adjacent land; and (2) provide service to travel over relatively short distances as compared to collectors or other higher systems. Local roads will, of course, constitute the rural mileage not classified as part of the principal arterial, minor arterial, or collector systems.

Extent of Rural Systems

The systems criteria above have been expressed primarily in qualitative, rather than quantitative terms. Because of varying geographic conditions (population density, spacing and size of cities, density and pattern of road network) it is not feasible to define uniform nationwide criteria on size of population centers, on trip length and traffic volume, or on spacing of routes, that would apply to all systems in all States. The results of classification studies conducted in many States throughout the country do, however, show considerable consistency in the relative extent of each system, expressed as a percentage of total rural road mileage.

Systems developed using the criteria herein are generally expected, in all States except Alaska and Hawaii, to fall within the percentage ranges shown in Table 11-2. The higher values in Table 11-2 would apply to States that have a less extensive total road network than is typical of States of similar population density. In States having a more extensive total network, the lower values would be

expected to apply. The range of percentages for rural collectors is for the total mileage of both major and minor collector roads, and applies to the statewide rural mileage totals; the percentage in any particular county may vary considerably from the statewide average. Areas having an extensive grid pattern of roads will usually have a lesser percentage of collectors than areas wherein geographic conditions have imposed a restricted or less regular pattern of road development.

Table II-2 -- Guidelines on Extent of Rural Functional Systems

	Range	**(percent)**
System	**VMT**	**Miles**
Principal arterial system	30-55	2-4
Principal arterial plus minor arterial road system	45-75	6-12*
Collector road system	20-35	20-25
Local road system	5-20	65-75

** With most states falling in the 7-10 percent range.*

Functional Systems in Urbanized Areas

The four functional systems for urbanized areas are urban principal arterials, minor arterial streets, collector streets, and local streets. The differences in the nature and intensity of development between rural and urban areas cause these systems to have characteristics that are somewhat different from the correspondingly named rural systems.

Urban Principal Arterial System

In every urban environment there exists a system of streets and highways that can be identified as unusually significant to the area in which it lies in terms of the nature and composition of travel it serves. In smaller urban areas (under 50,000) these facilities may be very limited in number and extent and their importance may be primarily derived from the service provided to travel passing through the area. In larger urban areas their importance also derives from service to rural oriented traffic, but equally or even more important, from service for major movements within these urbanized areas.

This system of streets and highways is the urban principal arterial system and should serve the major centers of activity of a metropolitan area, the highest traffic volume corridors, and the longest trip desires; and should carry a high proportion of the total urban area travel on a minimum of mileage. The system should be integrated, both internally and between major rural connections.

The principal arterial system should carry the major portion of trips entering and leaving the urban area, as well as the majority of through movements desiring to bypass the central city. In addition, significant intra-area travel, such as between central business districts and outlying residential areas, between major inner city communities, or between major suburban centers should be served by this system. Frequently the principal arterial system will carry important intraurban as well as intercity bus routes. Finally, this system in small urban and urbanized areas should provide continuity for all rural arterials that intercept the urban boundary.

Because of the nature of the travel served by the principal arterial system, almost all fully and partially controlled access facilities will be part of this functional system. However, this system is not restricted to controlled access routes. In order to preserve the identification of controlled access facilities, the principal arterial system is stratified as follows: (1) Interstate, (2) other freeways and expressways, and (3) other principal arterials (with no control of access).

The spacing of urban principal arterials will be closely related to the trip-end density characteristics of particular portions of the urban areas. While no firm spacing rule can be established that will apply in all, or even most circumstances, the spacing of principal arterials (in larger urban areas) may vary from less than one mile in the highly developed central business areas to five miles or more in the sparsely developed urban fringes.

For principal arterials, the concept of service to abutting land should be subordinate to the provision of travel service to major traffic movements. It should be noted that only facilities within the "other principal arterial" system are capable of providing any direct access to adjacent land, and such service should be purely incidental to the primary functional responsibility of this system.

Urban Minor Arterial Street System

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than principal arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system.

The minor arterial street system includes all arterials not classified as a principal and contains facilities that place more emphasis on land access than the higher system, and offer a lower level of traffic mobility. Such facilities may carry local bus routes and provide intra-community continuity, but ideally should not penetrate identifiable neighborhoods. This system should include urban connections to rural collector roads where such connections have not been classified as urban principal arterials.

The spacing of minor arterial streets may vary from 1/8 - 1/2 mile in the central business district to 2 - 3 miles in the suburban fringes, but should normally be not more than 1 mile in fully developed areas.

Urban Collector Street System

The collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial, and industrial areas. It differs from the arterial system in that facilities on

the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. Conversely, the collector street also collects traffic from local streets in residential neighborhoods and channels it into the arterial system. In the central business district, and in other areas of like development and traffic density, the collector system may include the street grid that forms a logical entity for traffic circulation.

Urban Local Street System

The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through-traffic movement usually is deliberately discouraged.

Extent of Mileage and Travel on Urban Systems

Table II-3 contains guideline ranges of travel volume (VMT) and mileage of each of the four functional systems for urbanized areas. Systems developed for each area using the criteria herein will usually fall within the percentage ranges shown.

Table II-3 -- Guidelines on Extent of Urban Functional Systems

	Range	**(percent)**
System	**VMT**	**Miles**
Principal arterial system	40-65	5-10
Principal arterial plus minor arterial street systems	65-80	15-25
Collector street system	5-10	5-10
Local street system	10-30	65-80

Functional System for Small Urban Areas

The systems and their characteristics listed for urbanized areas are also generally applicable to small urban areas. The basic difference is that, by nature of their size, many small urban areas will not generate internal travel warranting urban principal arterial service.

Thus the principal arterial system for small urban areas will largely consist of extensions of rural arterial into and through the areas. In many instances, these extensions will be located so as to relieve critical sections of the street system while providing efficient movement of travel around (e.g., bypasses) and

through the area. The larger urban areas within this population group, particularly those above 25,000 population, may have major activity centers that warrant principal arterial service in addition to that provided by extensions of rural arterials.

The characteristics for the minor arterial street systems, collector street systems, and local street systems in small urban areas are similar to those for urbanized areas.

Special Urban-Rural Identification

The criteria in this section define urban and rural streets and highways according to their functional character. To assure continuity of the rural arterial systems through urban areas, it is desirable to doubly identify (as indicated below) the urban arterials that form connecting links of the rural arterials. The term "connecting links" means those urban routings that will provide rural-to-rural continuity for the rural arterial systems. A connecting link may traverse the urban area from one boundary to another, or may simply connect to another previously delineated connecting link. (The mileage of any connecting link should not be included more than once). The necessary continuity may be provided by loop or bypass routes. It is recommended that the identification be made after both the urban and rural functional classifications have been accomplished.

As specified in the systems characteristics in this section, connecting links for the rural principal and minor arterial systems will be on the urban principal arterial system. Connecting links for rural principal arterials should be identified prior to selecting those for minor arterials. The routing of the connecting link for a rural principal arterial should normally be fairly direct, while that for a rural minor arterial may involve some indirection of travel.

The following categories are to be used in identifying these connecting links on the urban principal arterial system:

1. Other freeways and expressways:

- Connecting links of non-Interstate rural principal arterials
- Connecting links of rural minor arterials
- Connecting links of other urban principal arterials
- Connecting links of other rural principal arterials
- Connecting links of rural minor arterials

Footnotes

1. *A Guide for Functional Highway Classification*, prepared by a joint subcommittee of the American Association of State Highway Officials, the National Association of Counties, and the National Association of County Engineers (1964). (Originally footnote 1 on page II-5).
2. The term "serve" is difficult to define on a national basis since it varies according to the size of the urban area, the functional system under consideration, and the effects of natural barriers where they exist. As a guide the rural principal arterial system may be considered to "serve" an urban area if the system either penetrates the urban boundary, or comes within 10 miles of the center of the place and is within 20 minutes travel time (offpeak periods) of the center of the place via a minor arterial highway. The rural minor arterial road system "serves" an urban area if the system either penetrates or comes within 2 miles of the urban boundary. (Originally footnote 1 on page II-9).
3. The definition of a "large" town, in terms of population, cannot be arbitrarily determined in such a way as will fit all States. It can be determined in a given State during the classification process by building the system "from the top down," in terms of size of places served, and evaluating successive system increments on a diminishing returns basis, in terms of population service or traffic service. This is discussed in greater detail in Section III. (Originally footnote 2 on page II-9).

SECTION 9—REFERENCES: STATE LEGISLATIVE CLASSIFICATION

Source: *http://www.nh.gov/dot/org/projectdevelopment/planning/documents/ClassificationofHighways.pdf*

9.1 ~ NH DOT, Classification of Highways (RSA 229:5)

In order to understand the forms of aid available to cities and towns in New Hampshire, consideration should be given to the classifications of the highway system.

Class I, Trunk Line Highways, consist of all existing or proposed highways on the primary state highway system, excepting all portions of such highways within the compact sections of cities and towns. The state assumes full control and pays costs of construction, reconstruction and maintenance of its sections; the portions in compact areas are controlled by the cities and towns under Class IV highways.

Class II, State Aid Highways, consist of all existing or proposed highways on the secondary state highway system, excepting portions of such highways within the compact sections of cities and towns, which are classified as Class IV highways.

All sections improved to the satisfaction of the commissioner are maintained and reconstructed by the State. All unimproved sections, where no state and local funds have been expended, must be maintained by the city or town in which they are located until improved to the satisfaction of the Commissioner of Transportation.

All bridges improved to state standards on Class II highways are maintained by the State. All other bridges on the Class II system shall be maintained by the city or town until such improvement is made. Bridge Aid funds may be utilized to effect such improvements.

Class III, Recreational Roads, consist of all such roads leading to, and within, state reservations designated by the Legislature. The state highway department assumes full control of reconstruction and maintenance of such roads.

Class III-a, Boating Access Highway, shall consist of new boating access highways from any existing highway to any public water in this state. All Class III-a highways shall be limited access facilities as defined in RSA 230:44. Class III-a highways shall be subject to the layout, design, construction, and maintenance provisions of RSA 230:45-47 and all other provisions relative to limited access facilities, except that the Executive Director of the Fish and Game Department shall have the same authority for Class III-a highways that is delegated to the Commissioner of the Department of Transportation for limited access facilities. No access shall be granted to an abutter for any Class III-a highway. A Class III-a highway may be laid out subject to gates and bars or restricted to the accommodation of persons on foot, or certain vehicles, or both, if Federal funds are not used. The Executive Director of Fish and Game may petition the Governor and Council to discontinue any Class III-a highway.

Class IV, Town and City Streets, consist of all highways within the compact sections of cities and towns. Extensions of Class I (excluding turnpikes and interstate portions) and Class II highways through these areas are included in this classification. Municipalities with compacts are listed in RSA 229:5.

Class V, Rural Highways, consist of all other traveled highways which the city or town has the duty to maintain regularly.

Class VI, Unmaintained Highways, consist of all other existing public ways, including highways discontinued as open highways, and made subject to gates and bars, and highways not maintained and repaired in suitable condition for travel thereon for five (5) successive years or more. However, if a city or town accepts from the state a Class V highway established to provide a property owner or property owners with highway access to such property because of a taking under RSA 230:14, then notwithstanding RSA 229:5, VII, such a highway shall not lapse to Class VI status due to failure of the city or town to maintain and repair it for five (5) successive years, and the municipality's duty of maintenance shall not terminate, except with the written consent of the property owner or property owners.

Scenic Roads, are special town designations of Class IV, V and VI highways where cutting or removal of a tree, or disturbance of a stone wall, must go through the hearing process and written approval of local officials. (See RSA 231:157).